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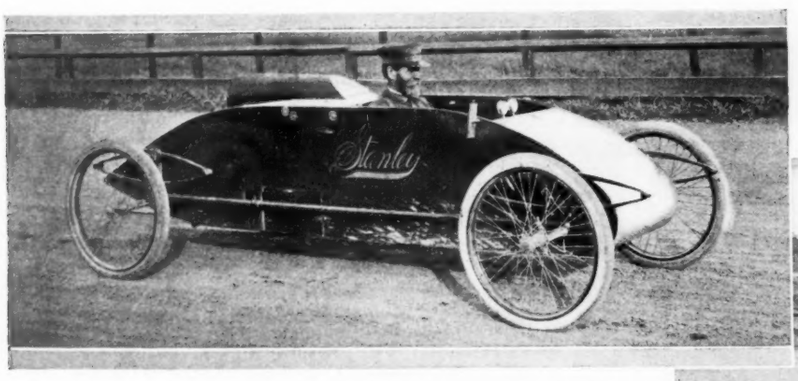
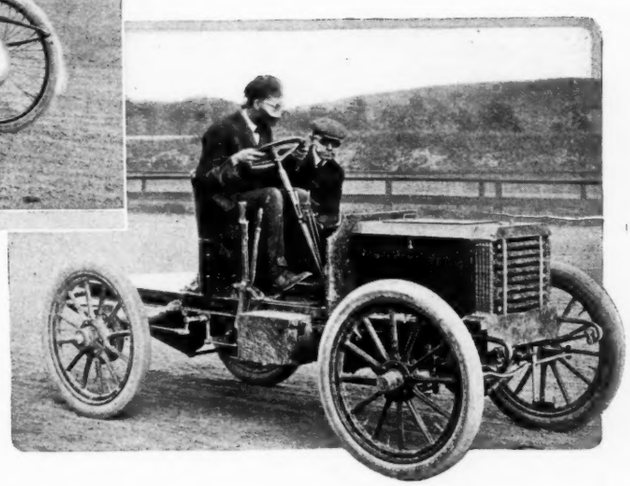
The AUTOMOBILE

New England a Factor In the History of Racing

Mishaps Brought Experience and Progress in Design and Construction—Forerunners of Modern Streamline Racers

By James T. Sullivan



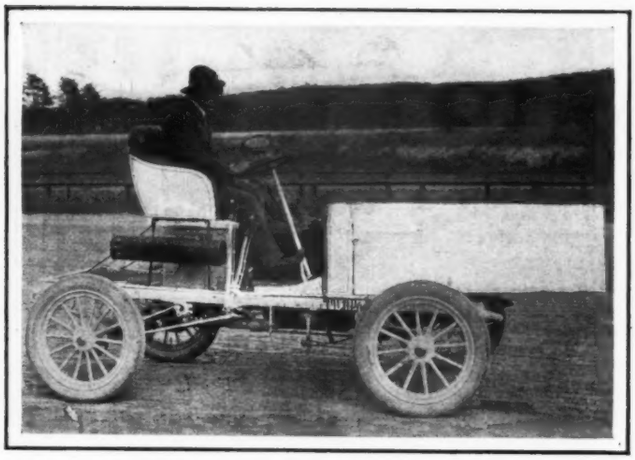


Above—F. E. Stanley in the Stanley steamer racing car in which he broke records at the meet at Readville, Mass., May 30, 1903. This was the first car of the kind ever built, the forerunner of those that swept Ormond Beach later. Right—J. L. Snow on his Peerless racer which made fast time in early Massachusetts races

BOSTON, July 11—When it was announced that the qualifying time for one round of the Indianapolis speedway was to be 1.42, and later when the cars tore around the track at an 80-mile-an-hour average or better, some of the men who participated in the first race meets in Massachusetts smiled at the thought of the difference between past and present. For New England, by the way, was in the van when it came to real racing and it furnished men and machines that made racing history in those days.

40 M.P.H. High Average for a Race!

Some of these men are still in Boston. From time to time they get together at outings and talk about the old days. At that time 1.42 was a pretty good average for a mile, not to mention that the Indianapolis distance is 2.5 miles. And 40 miles an hour for a race was splendid, only no one ever considered going that distance. Five miles was about the limit. At that time—we are going back now to 1902 and 1903—there was much eagerness and anxiety displayed in getting cars ready, but it was not the professional feeling that one finds now when a force of mechanics do a lot of the work. It was "do it yourself" the best way you could. And the finish of a race brought a lot of cheers mingled with laughter in which the losers joined as heartily as the winners. Also the private owners of the cars represented got excited and shouted for their favorite wilder than the fans at a ball game.



Webb Jay mounted on one of the early steam cars which made an excellent showing in the early days of racing

To go back to these first races the one that inoculated Bay Staters with the fever took place at the exclusive Country Club grounds in Brookline in 1902 on a half-mile track. To get into the club one must spurt blue blood when a vein is punctured, and so for some of the participants it was great sport to rub elbows with the élite. Larz Anderson, until recently Minister to Japan, and before that Minister to other countries, whose millions are many, and who by the way is one of the most democratic fellows one ever met, had become interested in racing about that time. He owned a number of machines, some of which he has yet, and so a race meet appealed to him. Of course star drivers were wanted. About that time Kenneth A. Skinner, a pioneer dealer and first president of the Boston Automobile Dealers' Assn., had won fame by making a round trip to New York with Albert Champion in 32 hours 22 minutes. His time for one way was 19 hours 15 minutes. It was marvelous. That was the time that the A. C. A. tour came to Boston in a couple of days. Harry Fosdick then jumped into the newspaper headlines by clipping 8 hours off Skinner's record, and he was the Barney Oldfield of the hour.

Half-Mile Race Was Too Long

Therefore the star attraction of the Country Club race meet was to be Fosdick, and a driver named Griffen, specially imported to drive the great Locomobile racer of those days. The race was booked to be a thriller as they both had steamers and all sorts of hair-raising things were expected. Anyway, the great moment arrived. When the flag dropped Fosdick was yelling "Wait a minute! wait a minute!" It seems his steam pressure was getting up beyond the danger point and he was trying to get his machine under control like a horse prancing about unmindful of a jockey's efforts to head the right way. Griffen shot off all right but, alas, Fosdick was left at the post. Meanwhile the spectators were watching the lone racer speeding around the half-mile track. He made the first corner all right, then the straightaway, but after that he began to slow up and finally he stopped. A half mile was too long even for him. So the great race blew up, to the merriment of everyone.

Big Two-Cylinder Motors Favorites

There was another big event carded, the special match between one of Alexander Winton's creations and a Pope Robinson. It was in this event that Larz Anderson was most interested, for he was the owner of the Winton. Two-cylinder motors with big cylinders were expected to do wonders, but even that race proved a bit tame after the start, for the drivers had to bother with their cars all the way and speed was out of the question.

There had been some races at Providence that year, too, and so the year following the Massachusetts A. C., a newly formed organization, decided to hold some races at the famous Readville track. This is a 1-mile circuit, and when in good shape it is fast for a dirt track. The club officials selected May 30 for the date, and so these events in 1903 really mark the first successful race meet in the Bay State. Looking back now over the old rules it seems strange to see the classification according to weight and with or without tonneaus. A stripped chassis, as it is known now, was not in evidence.

A New Radiator Every Day

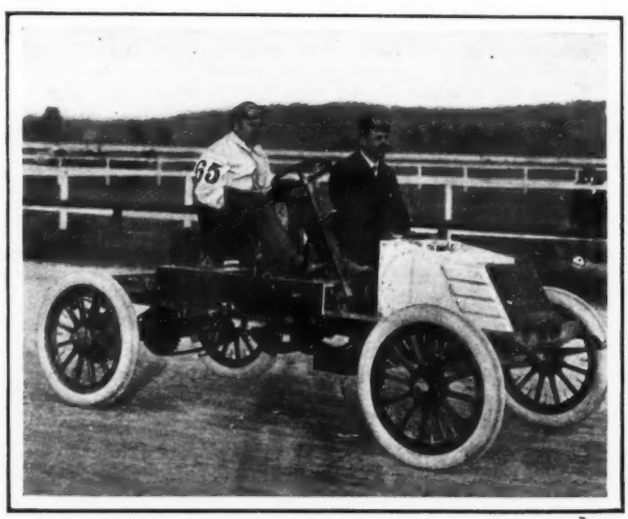
In that series of races there was a lot of fun getting ready for it, and participating in it. Jack Snow, now manager of the New England branch of the Peerless, had his troubles. It was late each day when he got a chance to go out to the track, some 20 miles from Boston. In fact, it was considered some feat in those days to make a non-stop run out or back. Jack was having trouble with the cooling system, and his radiator would shake so that it would spring aleak. He used a new one about every day. Finally he got a new radiator from the factory the morning of the race and he quickly put it on. But on the way out the motor would heat, and everywhere along the way where he could get water, he stopped and filled it up. Still it was no use. Finally the race took place and for 5 miles he drove around with a motor that got pretty hot. It was the same story in other events. He even borrowed a pump from another car and put it on, thinking that was the cause.

Excelsior in the Radiator

That night when he went over the machine he found that the radiator had come packed in excelsior, and a lot of it had got into the tubes so that they were choked. Of course such a thing could not happen nowadays.

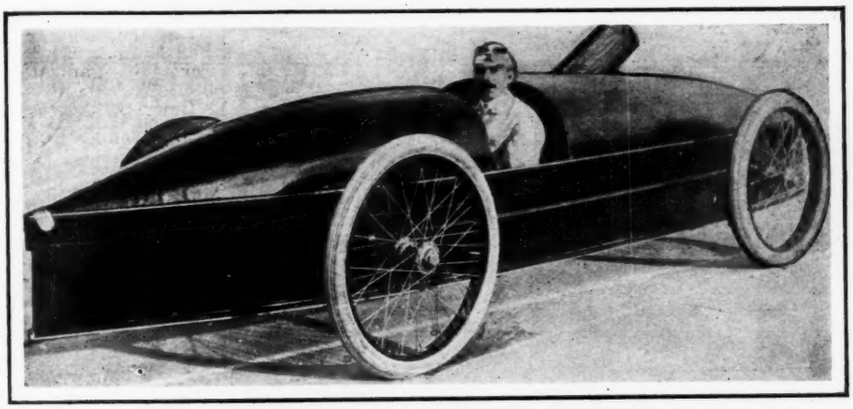
In those days when weight was the qualification tonneaus were taken off and put on with much speed. But that did not always do the trick. So the cars toted along several bars of pig iron or bags of sand to load into the machines to make them eligible for a heavier weight class. It used to be amusing to watch the weighing in and the dumping on or off some of the bars of pig iron or bags of sand, with the contestants watching to see that there was no jockeying with the weights.

In that first race meet there were some notable contestants. J. H. MacAlman, now president of the Boston Automobile



Harry Fosdick in his Winton, who was one of the star attractions at the first race meet held at the Country Club in Brookline, Mass.

Dealers' Assn., was a winner. L. R. Speare, ex-president of the A. A. A., figured in it. So did Frederic Tudor, one of the shining lights of clubdom in Boston, and the man who registered the first motor car under the Massachusetts laws, and who still carries every year the enviable 1 as his number plate. Then there was F. A. Hinchcliffe, now manager of the New England branch of the Winton, and A. R. Bangs, who sold the Franklin in those days. Louis S. Ross, the first man to win the Dewar trophy at Ormond, as well as a number of other prizes, was a participant.



Fred Marriott in the type of Stanley steamer which Louis Ross used in breaking records at Ormond Beach in the early days of automobile racing

Steamers Beat Racers' Time

Webb Jay came on to show what his machine could do. He did not have the famous "Whistling Billy" then, but used another White steamer that was said to be fast. Then there was F. E. Stanley, the Newton maker, who electrified the crowd with his steamer when he made the then marvelous time of 1:02 3-5. Also George Cannon, a Harvard man, who was a pioneer racer with steamers, and whose home-made car held the record until Stanley took it away from him in this meet. George Reed, now the agent for the Vulcan in Boston, but handling the Stearns then, also raced and so did Fred Durbin, the man who by retiring when he got married, gave Fred Marriott the chance to drive Stanley machines and win honors at Ormond.

Cannon continued to cut a wide swath for a couple of years with his steamer, then he had a Grout steamer built and later ordered Louis S. Ross to construct one for him. This last machine was guaranteed to do a mile in 25 seconds, and it had two boilers and a double motor. But Cannon never called for it. He dropped out of sight and has not been heard of in racing since. Ross got tired of racing after some of the cleaning up Ormond and he has quit racing, too. He is now in the railroad fuse business in Newton. Skinner is renting cars in Boston.

The First Pursuit Race

It was an interesting collection of cars, too. There was the Stanley close to the ground; the Cannon machine with its smokestack, and the drivers in front; the others with long and short hoods. Most of the events were limited to 5 miles, but there was one event that exceeded the limit. It was a pursuit race, and the two stars, Skinner and Fosdick, fought it out. The idea was borrowed from Australia, it seems. Skinner had a De Dion and he started from the wire while Fosdick was over on the other side at the half-mile mark. When the flag dropped it was Fosdick's job to catch Skinner or Skinner's job to overtake Fosdick. There was much excitement, as each driver had a lot of friends, and when passing the wire they were cheered and urged to speed up. Fosdick had more power, however, and mile after mile brought him nearer to the foreign car until finally he caught up with Skinner after going 9.5 miles. It was hailed as a great American victory. The time was 12:56 4-5.

Kenneth A. Skinner in the imported De Dion racer which he drove in the first pursuit race, which was practically the only event exceeding 5 miles in distance in the early New England race meets

Introduction of Odd Racers

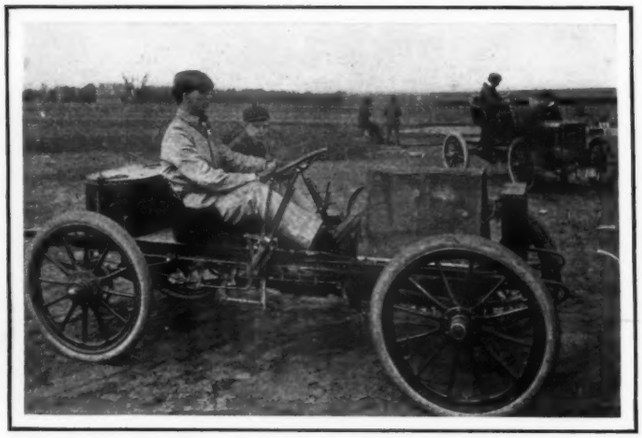
However, the star event of the day was the record-breaking achievement of F. E. Stanley, and the introduction to racing of the small cars that got all sorts of names from "woggle-bugs" to "torpedoes" from the racing scribes. It is interesting to look back now and quote from the papers of that date extracts about the race. Cannon had made 1:05 1-4 at Providence for a mile, and he and Stanley were invited to try to break that mark. So it was a special match. Here is what the Boston Globe said about it the next day:

"Terrific Speed of Racing Marvels

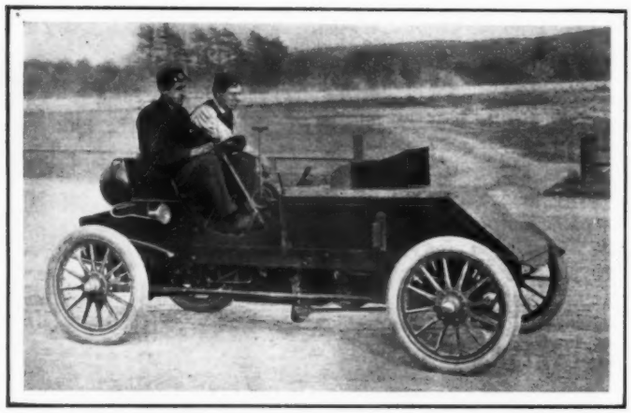
"Owing to the terrific speed at which these racing marvels travel it was deemed unsafe to start them together and the officials decided to run them against time. Roars of applause and the tinkling of automobile bells greeted the veteran Mr. Stanley as he prepared for his trial. His racer, setting close to the ground and shaped like an inverted torpedo, presented an odd appearance as it slowly moved up the track. Mr. Stanley, sitting in the middle, with just his head showing above the graceful curves of the bow and stern, resembled a gunner on a duck-shooting expedition more than anything else.

The Record Still Unbroken

"Without any apparent motion on the part of the operator the thing in red shot forward, emitting clouds of steam. Thrice did he circle the track and then the masked head nodded to Lon Peck, the starter, for the word. A pistol report rang out and the race against time was on. So terrific was the pace that few realized that the inanimate object was tearing around the track at such speed until car and man entered the home stretch, when the thousands broke forth in applause. The time was announced as 1:06, and the crowd relapsed, a trifle disappointed, but still hopeful of seeing the record broken.



Another view of John L. Snow mounted on one of his Peerless racers which upheld the prestige of the gasoline car in the early days of racing in New England



Charles Grout in a Grout steamer which made fast time in the early days of racing when rivalry between gasoline and steam driven cars was at its height

"Another low, rakish craft appeared on the scene. Every superfluous ounce of weight had been removed by Mr. Cannon for his trial, and his pet was in perfect trim for this great event. With the designer was F. L. Marselis, Jr., who added ballast as well as other assistance. The Cannon machine seen above the heads of the throng lined along the home stretch looked like the back of a dug-out, its smoke funnel projecting the least bit backward. The occupants sat in front of the boiler and were partly shielded from the wind by the long, low projecting bow. After a few times around the word was given and away sped the Cannon ball. Up to the first turn with a rush everything looked hopeful for a new record, but a wider detour on the turn lost some time, and when it reached the stretch it was going like a phantom. But 1:06 was the time announced and so far the race was a dead heat.

"Another race of a different class was decided while the boilers and tanks were filled and again Stanley came forth. This time, with the grace of a serpent, the racing contrivance glided down the stretch and flew around the turn. Into the back stretch darted the steamer, and down past the half mile post it shot with the velocity and certainty of an arrow. Intense silence reigned, as with unabated speed the torpedo went into the last turn. Not an inch did the machine swerve, Mr. Stanley holding it as close to the pole as he could with safety.

A New Record Made by Stanley

"With a whirr and a slew the low-clinging object appeared in the home stretch leaving a trail of steam and dust. Low murmurings grew in volume until they reached a great shout and the bells, gongs and horns took up the din as man and car neared the goal. Like a flash it was all over and then a hush fell over everything as the crowd waited for the official time. When the announcer shouted the time 1:02 4-5 there was a mighty cheer and the throng waited until the record-breaker sped around the track again. Mr. Stanley modestly acknowledged the great reception as he waited for Mr. Cannon to make his second try. Although the latter worked his steam car for every ounce, the best he could do was 1:04 2-5, breaking his own record, but 1 3-5 seconds slower than Mr. Stanley. So a new king was crowned."

Interest Centered in Getting the Pole

In a special match between Webb Jay and Frank Durbin, the former's car was put out of commission due to the gasoline catching fire, and so Durbin modestly refused to accept the win without competition. The races were pretty well contested, and there were not many runaways. The driver who got the pole had an advantage, for he could hug it and not cover so much ground as the fellows on the outside, and so the interest was centered in stealing the pole from each other. Then there would be a shout.

In those days the steamer and the gas car were very much in evidence and there was great rivalry. They had outclassed the electrics which, by the way, won the first race meet ever held, that at Providence some years previously. Following the 1903 events at Readville, which were a big success financially for there was an attendance of some 10,000 people, a big throng for those days, motor races became a yearly feature by the Massachusetts A. C. and later by the dealers themselves, and then the Bay State A. A. Sometimes there were two meets a year. But of late years they have been abandoned for lack of interest.

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English Engineers To Discuss Self-Starter

LONDON, ENGLAND, June 29—At the last council meeting of the Institution of Automobile Engineers, held at the headquarters at 13 Queen Anne's Gate, the program for the November session of the institution was finally decided. The meeting will open with the presidential address by Col. H. C. Holden. One of the papers to be read will be on the "Position of the Self-Starter in America," by one of the members of the Society of Automobile Engineers of America, who will be in England in November.

Other subjects to be dealt with will be "Lubrication of Motor Cars," "Some Experiments on Benzole," two papers on "Aspects of Commercial Vehicles, Gears and Gear Cutting," "Worm-Drive and Power Expended in Flight." A number of the members of the I. A. E. are contemplating a visit to Belgium this summer. More than thirty have already signified their intention of taking part in the trip.

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Safety Society to Test Rear-End Signals

NEW YORK CITY, July 15—Rear end signalling devices for automobiles wil be given a public test in the near future by the Safety First Society. There are many devices of this kind, several of which are ingenious, indicating not only the intention of the driver to slow down or stop his car, but also which way he intends to turn, whether to the right or left. These devices are said to be in general use abroad.

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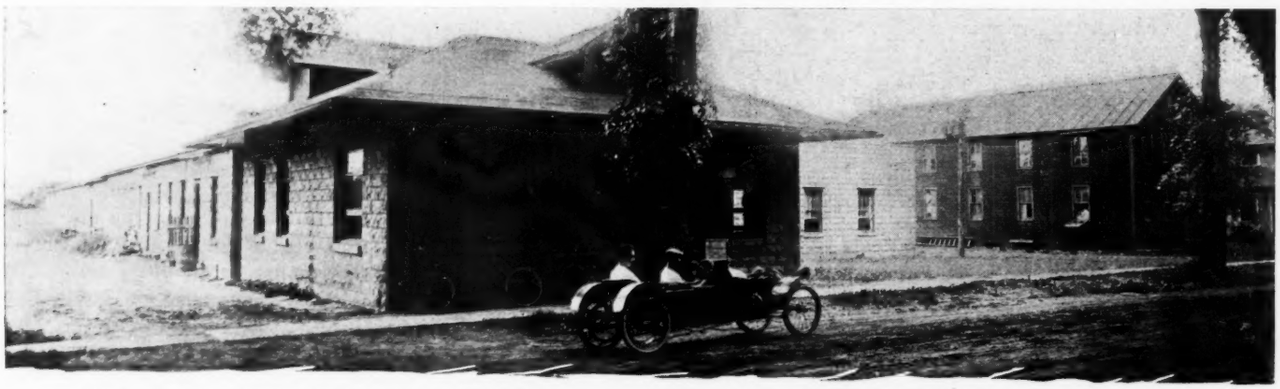
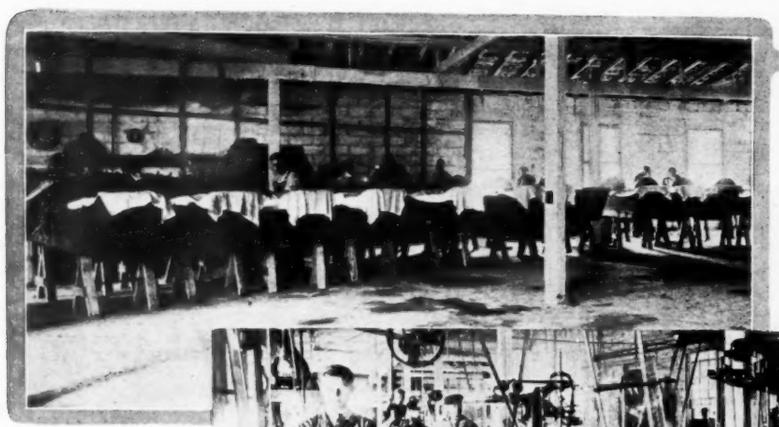
Workmen Call Off Westinghouse Strike

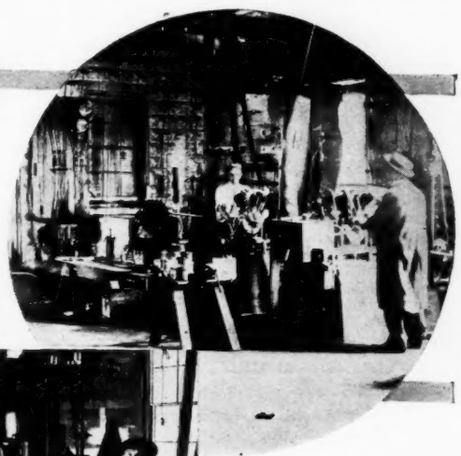
EAST PITTSBURGH, PA., June 14—The Westinghouse strike at East Pittsburgh has been called off by the workmen, the day set for returning to work having been set for Monday, July 13, a large number of men, however, reported on the Friday and the Saturday preceding. The works are now running full time.

One of the New Cyclecar Plants



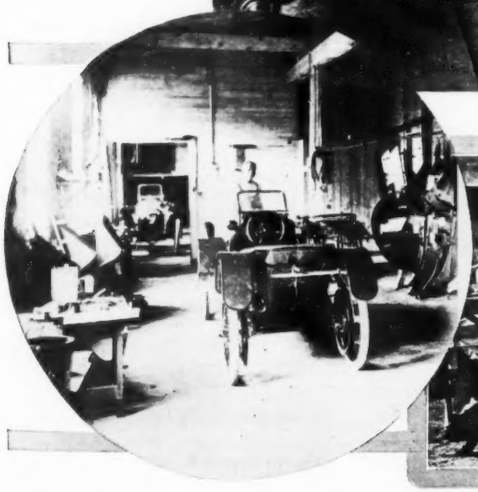
Main office and factory buildings of the O-WE-GO Car Co., Owego, N. Y., with an O-WE-GO car in the foreground





Above — View in the general assembly room, with bodies lined up in the preparatory stages of the assembly of O-WE-GO cyclecars

Above — Engine testing department. Note electrical test apparatus. Motors must develop 10 horsepower before acceptance by assembly department. Left—Machine shop in assembly department.



Left—Paint shop. Bodies are enameled and baked in ovens. Three coats of color and varnish are used. Right—One day's output

Bosch Now Produces Rushmore Systems

Fig. 1—New Bosch starting motor

Rushmore Generators and Starting Motors Added to Bosch Line—Complete Systems Now Available for Every Requirement

THE absorption of the Rushmore interests by the Bosch company places the latter in a position to supply complete electrical equipments for any car on the market. Previous to the combination the Bosch company had been at work on generator and starter designs of all types. The introduction of the Rushmore sliding-pinion flywheel starter into the Bosch line makes it possible to meet all requirements.

At present there are eleven designs of Bosch generators and three Bosch starting motors. The Rushmore designs, which will henceforward be known as the Bosch-Rushmore models, comprise three generators and four sizes of starting motor. The Bosch models are designed for operation on 12-volt circuits while the Rushmore machines are adapted for 6-volt installations.

So far, the only car to be completely equipped with lighting, starting and ignition as standard by the Bosch company is the Marmon. Figs. 2 and 3 show respectively the application of the generator on the pump shaft and the starting motor on the crankcase at the side of the flywheel in this particular installation. The simplicity of the Rushmore method is noticeable in Fig. 3, the motor being supported on an arm projecting from the crankcase. The pinion on the end of the armature shaft, overhanging the teeth on the flywheel is also clearly shown. When not actually turning the flywheel the starting motor is completely isolated, suffering no wear and causing no friction.

Generators of All Types

The several designs of generator are necesary to meet the different requirements both of speed and possible fitting positions on various types of engines. Three of the Bosch generators are shown in Fig. 4. That at the left is intended for drive by chain through a pinion at one end of the armature shaft. It will be noted that the shaft at the other end does not project through the casing. In this respect this design differs from the center illustration. Here the shaft passes right through the casing and so enables it to carry the drive to the magneto as in the Marmon installation, Fig. 2. Where the crankcase has not been specially designed to take such a generator in this position between the pump and magneto, the generator at the right, Fig. 4, is suitable, being provided with a base which is identical with the standard magneto and with the shaft center at the same height above the base. To meet the exceptionally low armature position it was necessary to use a two-pole field magnet having the

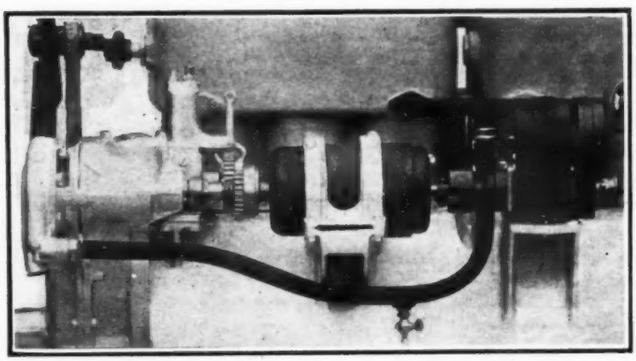


Fig. 2—Installation of Bosch lighting generator between the pump and magneto at the side of the Marmon engine

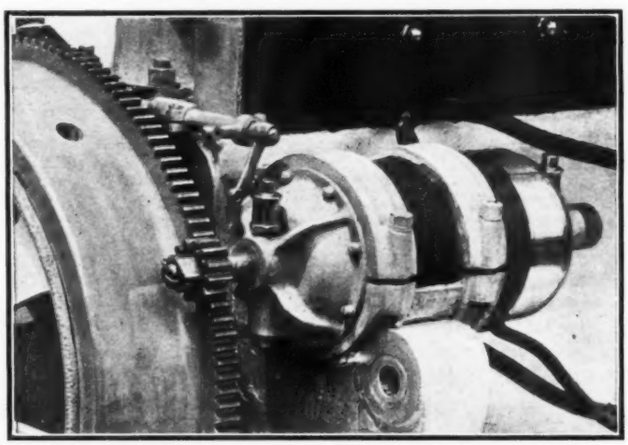


Fig. 3—Application of the Bosch-Rushmore starting motor, which operates directly on the flywheel, to the Marmon engine. Note the starting pinion, which is attached positively to the sliding armature shaft

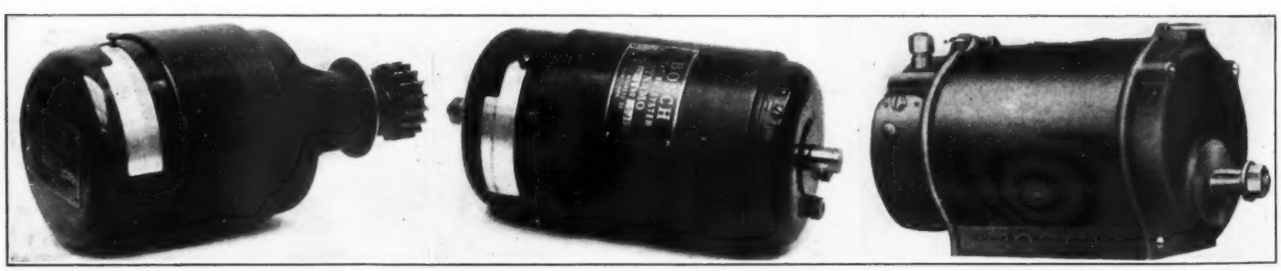


Fig. 4—Three types of Bosch lighting generators. At the left, for driving by chain. In the center, for insertion in a shaft line, for which purpose the armature shaft is carried through the casing at both ends. At the right, a special model with standard magneto base and low position of armature

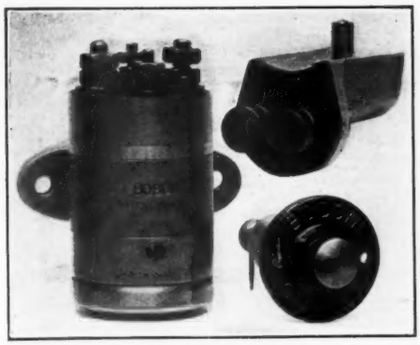


Fig. 5—Bosch electrically operated starting switch, which connects the starting motor to the battery by pressure on the small starting button at the right.

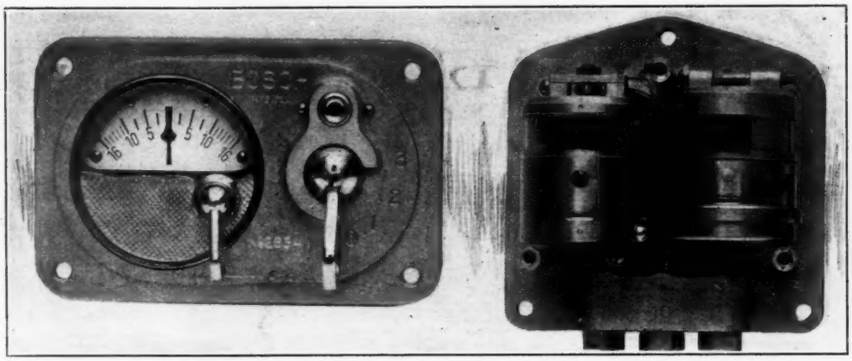


Fig. 6—At the left, instrument board for the Bosch system. The dial registers either amperes or volts. The switch arm is provided with a lock. At the right, the carbon-particle regulating device for the generator circuit, with the cover removed

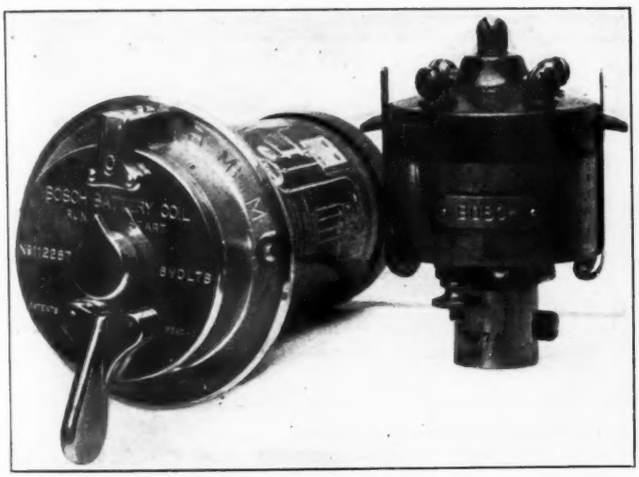


Fig. 7—Bosch battery-magneto switch and coil for dash mounting

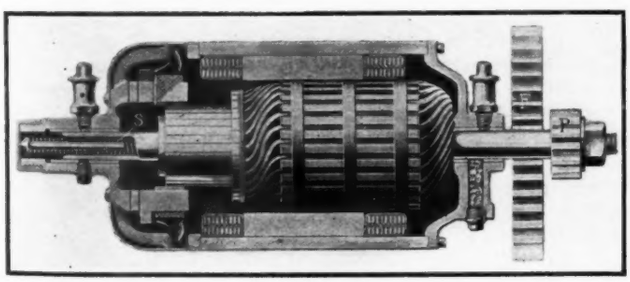


Fig. 8—Section through Bosch-Rushmore starting motor, showing displaced armature, which automatically draws the starting pinion into mesh on applying the current

field coils all located above the armature. In some of the types a gear is contained in the end cover.

Generator Control

Control of the current in the generator circuit in the Bosch installation is effected by the use of a solenoid regulator in the field circuit and a carbon-particle resistance, Fig. 6. The latter is contained in a compact case which can be conveniently located behind the dash. It is provided with a dust-proof cover. By tightening or loosening the nuts which regulate the pressure of the carbon particles any resistance can be obtained to suit individual running and lighting conditions. The battery used is known as the Bosch-Elba and is an Elba battery adapted to the requirements of the Bosch company.

Besides the carbon regulating device which can be located anywhere, there is a combined instrument and lock switch, Fig. 6, at the left for placing on the dash. The small lever below the dial is moved to one side or the other to read amperes or volts, while by locking the handle of the other switch it is impossible to operate anything electrical on the car.

Overrunning Clutch Used

The Bosch starting motors are of the overrunning clutch type and in order to insure correct switching in of the motor in the circuit the starting switch is not operated directly but through the agency of a small pilot switch. In Fig. 5 the cylindrical casing contains the electrically operated starting switch. Pressure on the small starting button at the right causes the contacts in the main switch to close, thereby connecting the motor directly with the battery circuit. The Bosch starting motor, Fig. 1, weighs 35 pounds and is 10.25 inches long by 5.85 inches diameter.

The small switch at the upper right, Fig. 5, is fitted on cars where it is desired to retain the starting crank. When cranking up, this switch automatically cuts out the magneto and connects the battery side of the ignition system. Immediately the engine fires the battery current is replaced by the magneto, also automatically. The dash coil and battery-magneto switch, which is another unit in the complete Bosch equipment is shown in Fig. 7.

Regulation of the Bosch-Rushmore generator is by means of an iron wire resistance or ballast coil placed across a series bucking winding on the field poles. A peculiarity of iron wire in an electrical circuit is that of suddenly increasing its electrical resistance when heated to a certain critical point. By so proportioning it that the heating is accomplished by the current itself the iron wire coil is made to act as a sort of electrical brake on itself, weakening the main fields and so cutting down the output of the dynamo.

Rushmore Principle Retained

No radical alteration has been made in the principle of operation of the Rushmore starter. In this method of starting the engine the motor is applied to the flywheel through a single pinion in mesh with teeth on the periphery of the flywheel. The means of bring the motor pinion into position for starting is unique among electric motors for this purpose. In applying the current the armature, which is held out of its working position by means of a spring at the end of the shaft is pulled up into the fields, carrying with it the pinion on the end of the armature shaft which then meshes with the flywheel and starts the engine. A section, Fig. 8, of the Bosch-Rushmore starter shows the Spring S at one end of the armature shaft and the pinion P at the other.

The Bosch-Rushmore starting and lighting system will be used on probably 80 per cent. of the installations. This in conjunction with the Bosch magneto and ignition systems constitutes a complete electrical equipment.

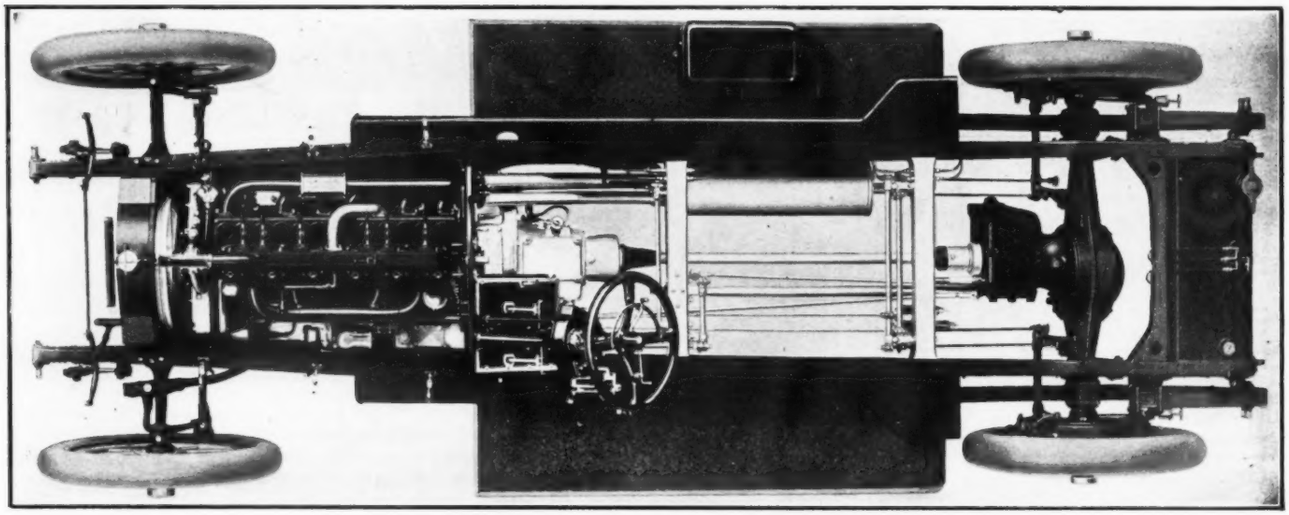


Fig. 1—Plan view of the chassis of the Packard 3-38 6 cylinder car for the 1915 season

Packard Continues Two Sixes

Changed Lamps and Carbureters —Separate Ignition and Double Exhaust Systems Continued

FOR this season Packard will continue its two sixes with but minor refinements. They will be known as the 3-38 and the 5-48 and, as the names suggest, will be practically continuations of the 2-38 and 4-48 of last season.

In general appearance they are practically the same as heretofore, having the same lines, and features such as the Packard form of radiator and sloping hood, the special type of bodies built in the Packard shops and so on.

Mechanically, too, there is little difference. General construction which has always been associated with the Packard chassis is still adhered to throughout. There are two main units, viz., the motor unit, comprising the power plant and clutch, and the rear axle unit, which consists of the final drive, gearset and differential gears.

Motors are practically identical with those used in the previous cars. They are both of the L-head type with cylinders cast in threes. The 3-38 has a bore of 4 inches and a stroke of 5½ inches, giving it an S.A.E. rating of 38 horsepower, while the 5-58 with its dimensions of 4½ by 5½ inches is rated by this method at 48. The company uses these ratings in designating the cars, but their maximum power outputs are 65 and 80 horsepower, respectively.

Headlamps Are Changed

There is one change in the outward appearance of the cars which is distinctive. This is the head lamp design. Each of the headlights has an auxiliary headlight with a separate reflector below the main lamp. The smaller lamp is an integral part of the other. These auxiliary headlights are designed for city driving or for meeting cars on the road but it is pointed out have the added advantage of being supported near the ground so as to throw light on the road ahead. With the addition of auxiliary headlights, the side lamps are reduced in size and are now designed to be used only when the car is standing at the curb or for driving in cities where headlights of any kind are prohibited The tail light and license tag illuminator have been replaced by a combination tail light and license light on the left rear fender.

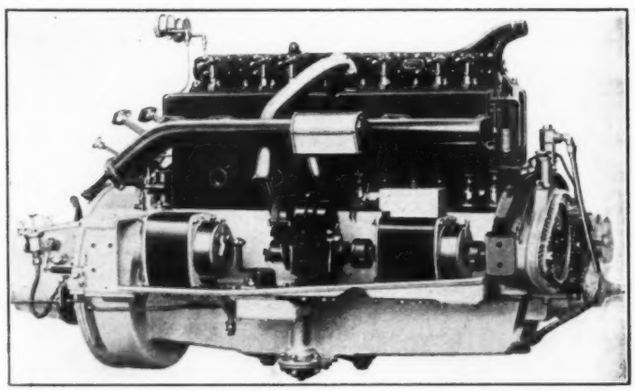


Fig. 2—Right side of the 3-38 motor with cut-away view in front

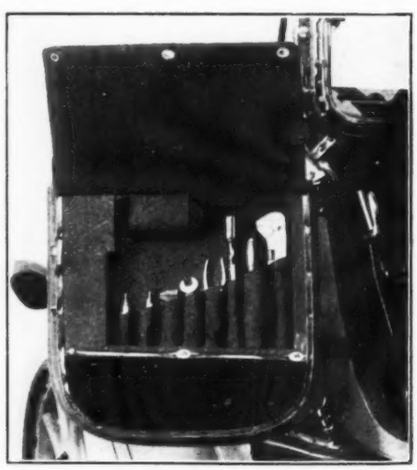


Fig. 3—Tool compartment in left front door

Though of the same operative design, the carbureter body has been changed in design so as to afford a housing for the auxiliary air valve. The opening in the housing is turned to the rear of the motor, thus reducing to a minimum the chances of getting dirt in the carbureter. Other minor changes are the increasing of the size of the radiator on the 3-38, the making larger of the gearset on this same model and the increasing of its motor's valves to 2⅛ inches.

Taking up the constructional details of the 3-38, the wheelbase is continued at 140 inches, which gives ample length for any desired type of body. Tread is standard at 56 inches, while the overall length of the seven-passenger car is 187.5 inches.

The engine has its valves all on the right side and completely enclosed. These are of nickel steel, mechanically operated from the camshaft and interchangeable. The inclosing covers are of aluminum and oil tight. Pistons fitted with three rings each are conventionally linked to the crankshaft by drop forged I-beam connecting-rods. The crankshaft, carried on seven large size main bearings attached to the upper half of the crankcase, is so mounted and its proportions such that no vibration is possible, making for quietness and smoothness of running.

Crankcase Split Horizontally

The crankcase which is conventionally split into two horizontal sections, has cast webs integral with the upper section on either side. These webs extend to the side members of the frame, and act as mud aprons, preventing any mud or water from splashing up onto the motor parts.

The hot water jacketed inlet manifold on the left side of the engine is continued. This has four openings into the cylinders, two for each block of three. These passages must go across to the valve side, and in running through the water jackets, assist further in fuel vaporization. The specially constructed double exhaust manifold is also continued. This has a separate passage for the burnt gases from each block of three cylinders so that there is no overlapping of the exhausts. There are consequently two pipes connecting from the rear of the header and running down to the muffler.

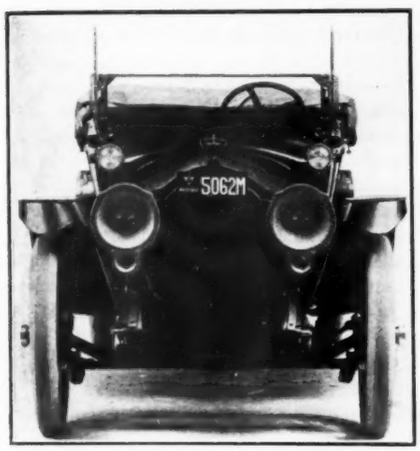


Fig. 4—Front view of Packard 3-38 touring car, showing new headlights

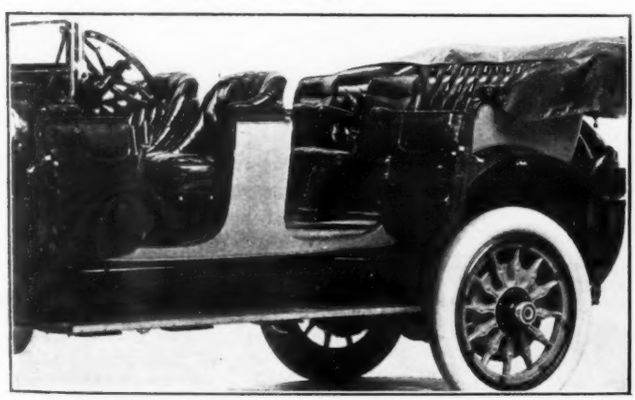


Fig. 5—Seating arrangement adopted in the Packard 3-38

As on the previous car, the ignition system is entirely independent of the lighting and cranking system. A Bosch duplex magneto is located on the right side of the engine.

The oiling system is unchanged. Lubrication is by force feed from a gear driven pump, located in the crankcase. This pump is driven by worm gear on the camshaft.

Packard-Bijur System Continued

The Packard-Bijur cranking and lighting system is retained with slight refinements. The cranking motor and the generator are separate units. They are both located on the right side and are readily accessible. The generator is driven by a shaft from the front gears and operates at 1½ times crankshaft speed, generating at speeds from 10 miles an hour and giving its maximum voltage at 15 miles an hour.

The cranking motor which has capacity to turn the engine at 100 revolutions a minute when the latter is warm is geared at about 19½ to 1 to the flywheel, and a pedal under the driver's heel operates the shifting mechanism and sends the current to the instrument for starting purposes.

Back of the engine is the dry plate clutch which is housed in unit with the power plant, its case bolting to the crankcase. The casing plates are faced with a special friction material while the shaft plates are of metal with ground faces. The driveshaft, which is uninclosed, is fitted with universal joints and drives from the clutch directly back to the gearset in unit with the rear axle.

Three forward speeds are afforded, while the rear axle itself has a pressed steel housing, and contains worm-bevel gears which were brought out first by the Packard company. These are a combination of the bevel type and the worm, the gear faces being curved so that they engage with a rolling action, giving contact throughout the engagement and making them noiseless.

The springs are of the usual form—half elliptic in front and three-quarter in the rear. They are underslung from the axles, giving a somewhat lower hanging of the frame. The spring sizes are 2¼ by 40 in front and 2½ by 53 in the rear.

The regular line of Packard bodies is still featured. There are all types of inclosed cars, as well as distinctive phaetons, and touring cars of the open type. Equipment is complete and prices remain unchanged.

Tires are 26 by 4½ inches in front and 37 by 5 in the rear.

The 5-48 has a wheelbase of 144 inches, and incorporates all the features of the 3-38 with the added advantage of more surplus power. The specifications of the 3-38 cover the 5-48 with the exceptions that all tires are 37 by 5, cooling water capacity is slightly greater, and front springs are ½ inch longer.

The appearance of the 5-48 is almost identical with the 3-38, bodies being interchangeable.

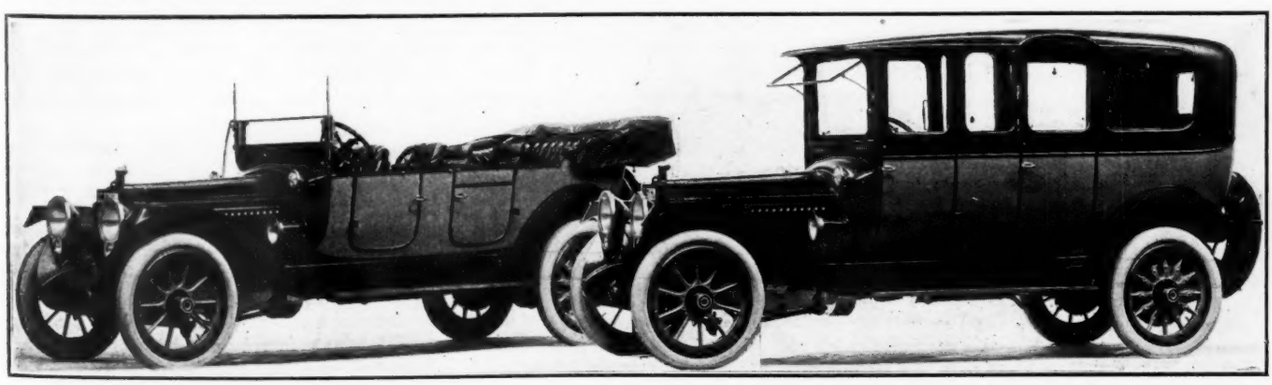
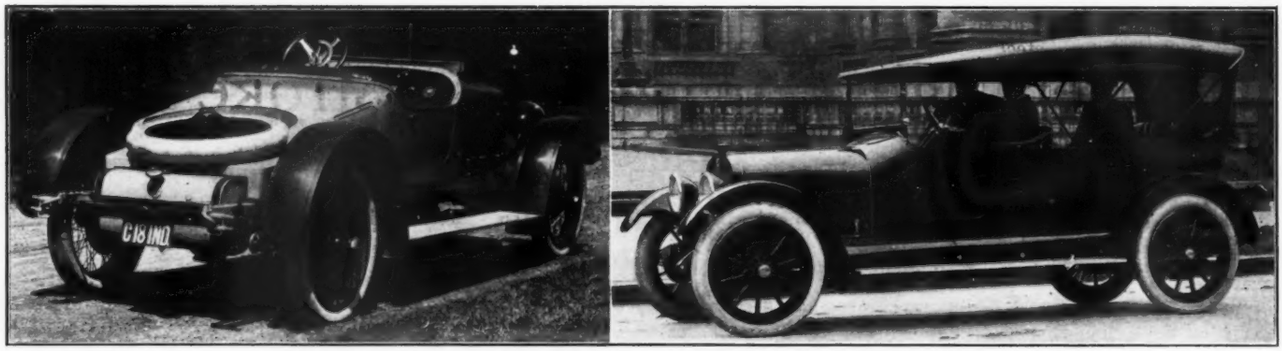


Fig. 6—Left—Packard 3-38 touring chassis with six passenger saloon touring body. Right—Touring chassis with limousine body



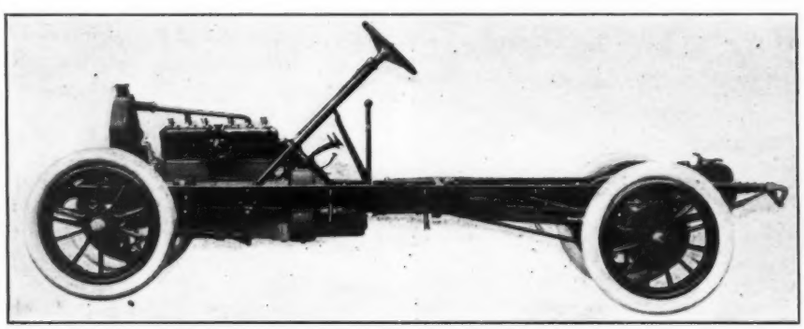
Left—Rear view of new Premier roadster. Right—The new touring car

Premier Continues T-Head Motor

PREMIER will continue the T-head model for 1915. Under the name of 6-49 this chassis will be a continuation of the 6-48 of the previous season but will be featured by a new roadster of racy lines with provision for carrying on the rear deck an extra wire wheel or two spare tires in an inset circular space into which they fit. The only mechanical change of importance in the chassis is the use of long semi-elliptic springs at the rear in place of the three-quarter elliptic. This has necessitated a few frame changes in order to meet the requirements of suspension.

Rather unusual factory equipment are the shock absorbers and recoil straps which are fitted. These, together with the rubber bumpers and the 60-inch semi-elliptic rear springs are designed to give maximum easy riding. The equipment also includes the Golde one-man-top, single piece ventilating windshield, Warner speedometer, and so on. Wire wheels are offered for the touring cars at $80 per set of five, but on the roadster either wire or wood wheels will be specified.

Starting and lighting is by the Remy system while an Eisemann magneto is used for ignition. The two- and five-passenger bodies will sell for $2,385 and the seven-passenger for $2,435 with full equipment.



Side view of chassis comprising 1915 Premier line

Cylinder dimensions of 4 by 5½ inches give the engine an S.A.E. rating of 38.4 horsepower, which is rather lower than the actual power delivered by the engine, the manufacturer stating that it delivers from 48 to 70 horsepower. Triplet casting of the cylinders permits placing the three cylinders close together, making a minimum distance between main bearings and center bearings. Lubrication of the motor is a circulating system with a constant level splash maintained by a gear driven pump. There is a sight feed glass on the dash. In the lower half of the crankcase are moulded transverse troughs. These have partitions between them so that the dippers on the ends of the connecting rods dip into the oil on any grade below 27 per cent. The oil which overflows from the troughs drains into the reservoir in the rear, and again is forced back into them. Pockets in the bearing journals catch the oil and feed it direct to the bearings through the oil holes.

Valves are completely inclosed and the push rods have 1-inch rollers which are ground inside and outside. The flywheel is completely inclosed and the whole T power plant is suspended at three points. The three-speed gearset is in an oil-tight housing and the gears are cut from nickel-steel forgings, the shafts running upon annular ball bearings. The ends of the transmission shaft are provided with stuffing boxes which prevent leakage of oil. The rear axles are made under the Premier patent and are generally termed a three-quarter floating type, inasmuch as this carries none of the load, but the shaft cannot be pulled out of the housing without disconnecting from the differential pinions. The Premier people call it "90 per cent. floating axle." It has an internally ribbed center housing so that truss rods are dispensed with. Handholes in the rear of the housing permit the gear to be adjusted to take up wear. The brake drums are an integral part of this clutch and hub arrangement. The internal brakes are operated by a pedal, and are steel shoes. The emergency brakes are external and are steel bands covered with Raybestos. The brakes altogether provide 526 square inches of braking surface. Tires are 36 by 4½ inches in size, although 34 or 36-inch wheels are offered on the touring car as an option.

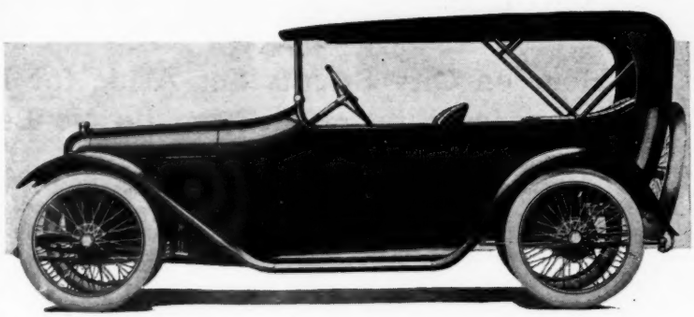
The framework is of oak braced with steel over sheet metal panels. Special protection is provided against rattling of the hood, and the front fenders are flanged to make a rigid connection between the splash guard and the car. All fenders are crowned and the inner ends are brought down several inches below the running boards.

In the touring car spare tires are carried in a cradle at the rear, which provides for two extras. The headlights are of the two-bulb type, providing brilliant lights for country driving and less intense ones for the city, this doing away with any side lamps. There is a combination tail and license lamp, an instrument lamp, and inspection lamp, all being independently operated. A motor driven tire pump is provided which is gear driven from the engine. The steering column which is on the left side is provided with a carbureter air adjustment.

Fischer Light Car Has Long Stroke Motor

Three Body Styles Supplied in Streamline Design—Deliveries To Be Made August 20

FISCHER is the name of a small car built by the C. J. Fischer Co., Detroit, Mich. At one time C. J. Fischer was connected with the Lavigne Co., and was interested in the production of the small car by that concern last winter. Mr. Fischer is now head of the C. J. Fischer Co., and the new Fischer car is made in several body styles ranging from $595 to $845.



Side view of Fischer touring model with one-man top

The company expects to produce from 5,000 to 10,000 cars the first year. It is now negotiating for plants and expects to make deliveries by August 20.

The Fischer is a small car with a block motor 2 3-4 by 4. A three-speed selective gearbox is a unit with the motor. Shaft drive construction with a semi-floating rear axle are used. The wheelbase is 104 inches and the tread is the standard 56 inches.

The body styles are: Model A speedster $595, tires 30 by 3; Model B Two-passenger car $595, tires 30 by 3; Model C cabriolet two-passengers, $645, tires 30 by 3; Model D, four-passenger touring, $645, tires 31 by 3.5; and Model E four-passenger sedan, $845, tires 31 by 3.5.

The designs of all the body styles are conventional streamline effects. The speedster is really a racing design with large hood in the cowl and very low seat, the effect being accentuated by semi-elliptic springs mounted below the axles. It does not carry fenders.

The two-passenger roadster is also a low-hung type but uses three-quarter elliptic springs and has a high-sided body with all equipments.

Wire Wheels Standard on Speedster

The standard equipment on all models is artillery wood wheels with the single exception of the speedster, but a set of five Houk wire wheels can be secured for $30 extra. The speedster carries these as regular equipment. Where wood wheels are used demountable rims are fitted.

All models use a V-shaped radiator designed to be proportionate to the chassis size, and rounding the radiator at the top takes away the abrupt line at the front. Crowned fenders are used.

The equipment of all models includes an electric cranking and generator system, speedometer, windshield, top, etc.

The motor used is a standard Perkins type made by the Massnick-Phipps Co., Detroit. It has a bore of 2 3-4 inches and a stroke of 4 inches, giving a rating of 12.10. The motor readily turns up 15 horsepower. The power plant is three point.

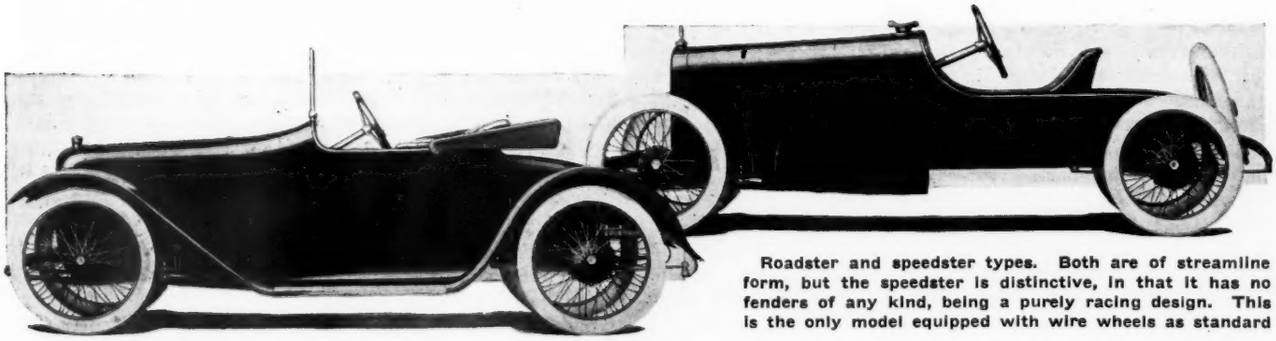
The cylinders are block cast and are L-head with the valves on the left and inclosed. The crankcase is of the barrel type, which construction is much used on small motors due to the greater rigidity which it gives to the crankshaft bearings and to the better machining. Inspection of the bearings is made possible through the plate at the bottom which also forms the reservoir for the oil.

An unusual feature is the manifolding on the left side. The intake and exhaust are really cast in one piece, the passages to the various openings and to carbureter and exhaust pipe being cored within the casting. The exhaust passes above the intake and there is an opening to each cylinder. Below this there are the two passages to the intake ports, a short pipe from the carbureter connecting to this casting at the center. The exhaust pipe joins the combination manifold at the rear. This construction has the advantage of assisting gas vaporization and should make for a better atomized mixture.

The oiling is done by a plunger pump and splash from the ends of the connecting rods dipping into the individual oil troughs.

Cooling is by thermo-syphon and ignition by the Atwater-Kent distributer system.

The motor gives its power to the rear through either a cone or multiple disk clutch and thence to a three speed selective sliding gearset. Thence it is passed on by a 3 1-2 per cent. nickel steel drive shaft which is equipped with a Spicer universal joint. The rear axle is semi-floating of the bevel gear type and its axle shafts are carried on Hyatt bearings, while the pinion shaft is mounted on double-row ball bearings.



Roadster and speedster types. Both are of streamline form, but the speedster is distinctive, in that it has no fenders of any kind, being a purely racing design. This is the only model equipped with wire wheels as standard

Prophesies Internal-Combustion Motored Car Simpler than Electric

The Automobile Engineers' Forum

Thinks 40 Miles an Hour on City Streets Set Aside for Rapid Traffic Is Mild Expectation for Future—Automobile No Longer a Fashionable Fad But a Necessity

COLUMBUS, O.—Editor THE AUTOMOBILE—There are a number of points in the recent address of Dr. C. P. Steinmetz on electric vehicles, reported in your issue for June 11, which would be interesting subjects for further discussion in your columns.

That the automobile is to a large extent following the history of the bicycle is a statement which few will deny, but it may indeed be doubted whether the decadence of the fashionable amusement of motoring will relegate the gasoline vehicle to the very limited field of usefulness prescribed by the noted electrician.

As to big, unwieldy engines, their day is even now almost over—their doom was sealed at Indianapolis when a car of only 183 cubic inches displacement made its wonderful showing.

The future competitor of the low-priced electric will be a gasoline vehicle with no excess power or weight, and with parts selected with a view to maximum simplicity and reliability. Thus developed, its advantage over a vehicle depending on any present form of storage battery will be considerable.

40 m.p.h. on Special Streets

It must first be understood that there is nothing fixed or final about present limits of speed in ordinary driving. The average speed of human transportation has been an ever-increasing variable ever since power was first harnessed. Present speed limits for safe driving are governed by mechanical reliability, road conditions, and (principally) by psychological state of both motorists and pedestrians. All of these factors will show great improvement in the future, and in a few years it may be possible to drive through a city at 40 m.p.h., perhaps on streets set apart for rapid travel, with safety fully as great as at 15 m.p.h. under present conditions. The business man, or workingman, may then have a cozy country home 10 miles from his work, and reach it in no more time than the city man now spends turning corners and dodging pedestrians in the city.

Certainly the congestion of city residence must be relieved in the future in some such manner as this; and the storage-battery vehicle will not do it. Central-station battery charging with daily delivery of car will be prohibited by distance and high labor cost; private rectifier plants involve cost, attention, and usually poor care of batteries. As to weather reliability, the internal-combustion vehicle is steadily gaining on the storage-battery type, and may soon greatly exceed it. And for every-day transportation speed will be as essential to the future vehicle as it is to the present railway train.

Control Can Be Made Simple

As to control, it can be made simple if desired. Manual spark control is no longer necessary for satisfactory operation and economy; gear-changing can be done mechanically or electrically if desired, and need hardly be more difficult than using the controller of the electric.

The bicycle is limited in its sphere of usefulness by its low speed and carrying capacity, and by the disinclination of man for work. But the light internal-combustion vehicle has possibilities of time-saving and cheap convenience which cannot be impaired by the passing of a fashionable sport.—H. K. RANDALL, M. E. in E. E.

Thinks Present Agitation Against Headlight Glare is Overdone

BOSTON, MASS.—Editor THE AUTOMOBILE—One of our engineers, who is now in England, has kept in close touch with the various tests of devices and lamps constructed with a view toward eliminating the glare of headlights, but according to reports which we receive from this gentleman, nothing has yet been evolved to satisfactorily reduce the glare without impairing volume of illumination.

We have experimented with so-called non-blinding glass; we have tried a partial eclipse with celluloid, glass, etc., in order to bring the ray below the eye level, but while we have been successful in eliminating undue brilliancy, we have at the same time been obliged to minimize the power of the lamps.

To be quite frank, we believe that this present agitation is being overdone, and that the effect of approaching headlights at night is not so serious as some people seem to believe. As a matter of fact, the drivers of approaching cars are but momentarily within the glare of the beam and immediately pass therefrom.

No Way to Solve the Problem

So far as we can determine, there is no way in which this problem can be solved. As soon as the dazzling effect is minimized the illumination is reduced in proportion, and we believe that the brightly lighted highway is of vastly more importance to the automobile driver than the occasional meeting with a car equipped with powerful headlights, coming in the opposite direction.

We are selling a great many headlights equipped with our dimming attachment. This is in reality two bulbs of different candlepower within one of our standard headlights.

In the center is the regulation bulb, and when the lighting switch is turned all on or head and rear on this bulb is illuminated and the small 4-candlepower bulb at top of reflector remains unlighted.

When the operator desires to dim headlights the switch is turned side and rear on. This lights the small bulb and the large bulb becomes inactive.

We have had submitted to us various attachments, such

as swivel shields of blue glass, patches to be placed immediately in front of the steering column; and now we hear of a pair of goggles recently invented by a motorist in Massachusetts whereby the approaching glare is entirely eliminated. However, none of these accessories seem to be practicable. It is quite possible that there is a genius somewhere who will some day evolve a non-blinding headlight which will possess all the qualities of the regulation headlight, but the perfection of such a device is evidently in the distant future.

A discussion along these lines should result in an interchange of ideas and opinions which may bear fruit in the way of a glareless headlight. We shall watch future pages of THE AUTOMOBILE with a great deal of interest, and we sincerely hope that you may be able in this way to solve the problem.—GRAY & DAVIS, INC.

Supply Dimmer Switch for Headlights Under Protest

BRIDGEPORT, CONN.—Editor THE AUTOMOBILE—We have tested every known method of cutting down the glare of electric headlights for automobiles, cyclecars and motorcycles. We are supplying the electric lighting equipment for a large number of manufacturers of cyclecars and small automobiles.

We do not advocate the use of the dimmer switch but we are forced to supply this because our trade demands this type of device.

In the first place, when the searchlight is provided with two electric bulbs, it provides an insurance to the auto driver and guarantees to him having at least two bulbs in good condition at all times. Two headlights each equipped with two bulbs provide four bulbs and leave a sufficient margin of safety.

Dual Bulb System Best

The small pilot light can be a 1, 2, 4 or 6 candlepower bulb to provide the necessary and essential amount of illumination for driving in any part of the country. If the automobile owner does 95 per cent. of his driving in a well-lit city, a 1 candlepower pilot light is of sufficient brilliancy. If the owner resides in the suburbs, a 2 or 4 candlepower is sufficient. If he lives in the country, the 6 candlepower will supply all the light required for driving a short distance until he can again use the searchlights. The writer has tested this dual bulb system so thoroughly that he is convinced that he is wasting his time to consider any other system because the results are sure, satisfactory, comply with the law and provide a sufficient supply of light for driving at the same time cutting down the dazzling glare that is so annoying to other drivers and to horsemen.—E. A. HAWTHORNE, President Hawthorne Mfg. Co., Inc.

Thinks Practical Ideal Car Possible by Correct Design

WATERLOO, IA.—Editor THE AUTOMOBILE—If you were in the manufacturing business sitting in judgment of the ideal car designed by your engineer you would know something of the vagaries and the chimera of the man of theory.

It is only by long experience and putting to practical use theories, that facts are established and frequently theories are demolished.

It is related that Prof. Agassiz, a great naturalist, on his way into the Maine woods to study fish was being regaled with fish stories by his guide who told him that speckled trout were frequently found where they were going, that weighed 7 or 8 pounds. The great naturalist told the ignorant guide that this was impossible, that speckled trout couldn't grow to that size. The naturalist in telling the story, said that he on the next day caught a speckled trout that weighed over 9 pounds. Thus was a lifetime of theory exploded by a single fact.

The theoretical ideal car costs a little more to build and turns out to be no better than the actual one.

Did you know that the great inventions and discoveries of the age are largely made by tenderfeet in the profession to which they belong, that is to say, men who are uneducated in the business and have no more sense than to depart from the theory and try out by experiment and thus learn.

Duesenberg Is an Example

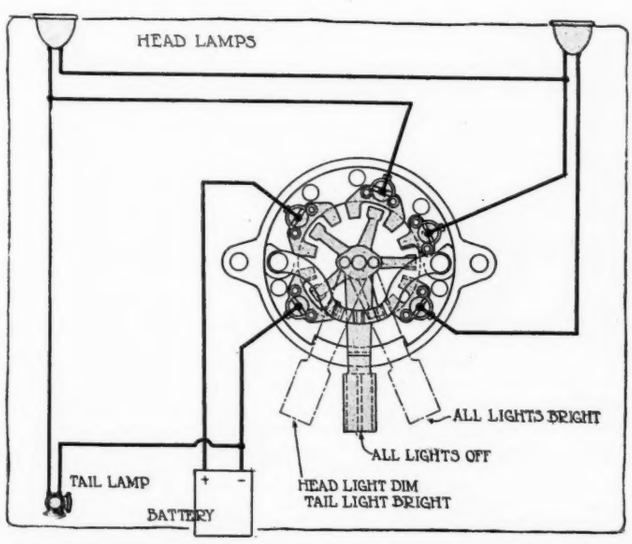
To illustrate the point I am trying to make on a theoretical ideal car, in 1905 Fred Duesenberg, educated in the common schools of Iowa without so-called technical education, obtained in schools and colleges, built his first two-cylinder motor for an automobile, following out a design he had used in producing a motorcycle. By common consent that motor proved to be the greatest two-cylinder motor ever put into an automobile.

Mr. Duesenberg built a single-cylinder motor so arranged that he could produce any degree on his camshaft by threading his shift and by an ingenious device could raise or lower the cylinder and thus increase or decrease the compression and could also set the cylinder off center on one side, then by careful experiment under a brake test he determined the proper degree to set his cams, the proper compression and the proper offset.

The Real Ideal Car

The information he gained there, he applied to the two-cylinder motor and has also applied it to the motor that we are now building into cars and the cars with this motor in them are meeting with the most enthusiastic reception by the public.

At the same time our agents, some who have been with us for the last 4 years and furnished us money to run on, still have their ideal car. Their ideal car doesn't consist of machinery parts, but simply of the painting, upholstering, body lines, top, etc. They say that it seems at times as though you could sell anything in a chassis that had a body and finish that appealed to the customer, and at the same time we are continuing to build an automobile to run and sell and stay sold.—E. R. MASON.



Wiring diagram showing the method of control used for dimming headlights by the Hawthorne Mfg. Co.

Gearset of Geometrical Design Is Best

Makes Gearshifting Easier Than the Arithmetical Design with Less Danger of Clashing—More Power on Third Speed of Four-Speed Type

By W. C. MARSHALL

Part I

A CHANGE speed gearbox employing a geometric ratio between first, second, third and fourth speeds, is a better type of gearset for an automobile than an arithmetical design in which an arithmetical ratio is maintained between the different successive gear ratios.

The geometrical type of gearset is better because with it gearshifting is easier, and there is less danger of clashing. Further, the geometrical design of gearbox gives more power on third speed in a gearbox with four speeds forward.

A geometrical gearset, say with four forward speeds, is one in which the increase in ratio is in the form of a geometrical progression, as, 1, 2, 4, 8. To explain: Your gear ratio is 8 to 1 on low, is 4 to 1 on second speed, is 2 to 1 on third, and is 1 to 1 on fourth or direct. In a geometrical progression, the ratios are multiples of 1 or 2 or 3 of the preceding number, thus in the example, 2 is double of 1, and 4 is double of 2, and 8 is double of 4. Another geometrical ratio might be 1, 3, 6, and 12. Still another 1, 3, 9, and 27.

The Arithmetical Gear Ratios

On the other hand, an arithmetical progression is one in which the increase in ratio is accomplished by even steps. Thus, in your four-speed gearset, the four gear ratios may be: 1, 5, 9 and 13, that is, 13 to 1 on low, 9 to 1 on second, 5 to 1 on third, and 1 to 1 on direct. You will note that 4 has been added in the arithmetical ratio. We could have another arithmetical ratio in which 3 might be added, and it would be 1, 4, 7 and 10.

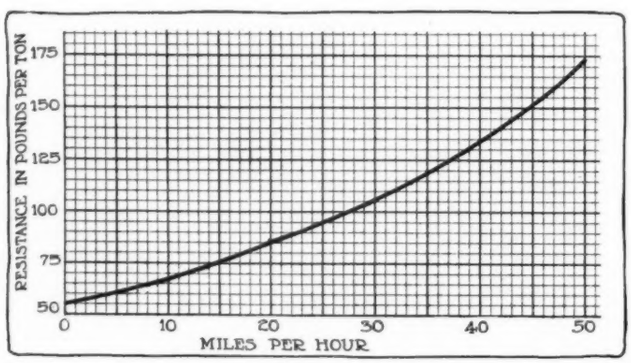


Fig. 2—This diagram is intended to show that the car resistance in pounds per ton of car weight is greater at high speeds in miles per hour than at low speeds. For example: At 25 miles per hour the car resistance is 95 pounds per ton weight of car, whereas when the car is traveling 50 miles per hour the car resistance has risen to 170 pounds per ton of car weight. Now, Fig. 1 shows a power curve which falls as the speed of the motor is increased in r.p.m., whereas Fig. 2 shows a curve of car resistance which rises as the speed of the car in miles per hour rises. Consequently, the gearbox is the necessary go-between to bridge the gap between the diverging conditions in Figs. 1 and 2; in a word, the gearbox is the means whereby we furnish the power to overcome the higher resistance of the car from the motor at low speeds

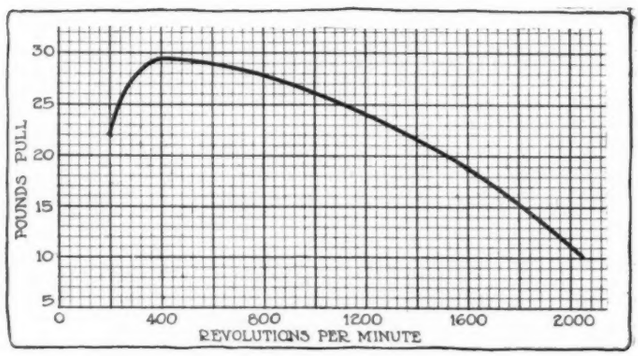


Fig. 1—This diagram shows why a gearset is necessary in a car. The curve shows that the power from the motor is greater at 400 r.p.m. than at 1,800 r.p.m. so far as actual pull is concerned, and this is because the pressure in the cylinder is greater, which is the case because a greater charge of gas enters the cylinder at 400 r.p.m. than at 1,800 r.p.m.

Here then we have what is meant by a gearset employing geometric ratios for the different forward speed changes, and also what is meant by a gearset employing arithmetical ratios for its different formed speeds. The question to be proven in this article is that the set with a geometrical ratio is preferable for different reasons than the gearset with arithmetical ratios. The following paragraphs tell first why it is easier to shift gears using a geometric type of gearset, and also why there are more equal changes in motor speed with the geometric type than with the arithmetical.

In any gearset the desired object to be attained is that there is the same change in motor speed between first and second as when shifting between second and third or shifting from third into fourth. In the geometric gearset these steps are uniform, whereas in the arithmetical gearset they are not, and to this are ascribed the reasons for greater difficulty in gear-shifting with the arithmetical gearset.

Why Use a Gearset?

First we must ask ourselves why we need a gearset. Here is the answer: The modern automobile, which has an internal combustion engine for driving power, is, to a large extent, dependent on the range of power compassed by its motor. This is largely governed by the size of the motor. The motor develops its power not at a given number of crankshaft revolutions per minute, as a steam engine, but at varying revolutions.

If it could develop as much horsepower at few revolutions per minute as is possible at many revolutions per minute there would be less call for large motors and fewer speed changes in the gearbox.

The ordinary motor develops its maximum pressure on the piston (about 95 pounds per square inch) when the engine

speed is about 800 revolutions per minute. If the speed increases the gaseous mixture has not sufficient time to enter and fill the cylinder, therefore the pressure becomes less and the turning power per revolution decreases.

One Reason for Gearset

The curve of average pressure in the cylinder has a form in general like that in Fig. 1. It is evident that a load cannot be carried by the engine at a low speed, therefore if an engine were directly coupled to the driving wheels of a motor car it would be impossible to start the car without outside assistance.

The average pressure on the piston multiplied by the radius of the crank equals the torque of the motor. If the torque is multiplied by the revolutions per minute and the length of the circle through which it moves, the product equals the foot-pounds of work performed by the motor in a minute. The horsepower exerted can be found by dividing these foot-pounds by the foot-pounds per horsepower, namely 33,000.

Horsepower can obviously be increased by increasing the revolutions per minute. As more horsepower is needed to start a motor car than to keep it in motion, except for high speeds, some means must be employed to enable the motor to run at high speed at a time when the car is running at slow speed. The curve of resistance of a car (on a level road) can be represented graphically as in Fig. 2.

Where the Gearbox Comes

As the torque curve is shown by Fig. 1 to be of little value before the engine reaches 400 revolutions per minute we must introduce some mechanism between the motor and the driving wheels which shall allow the engine to run at a high number of revolutions per minute while the road wheels are rotating slowly. The most common mechanism to-day is the gearbox in combination with the clutch.

Deciding on Gear Ratios

Let us consider the problems which determine the design of the gearbox. The motor design and brake test give an idea of the power available under the bonnet while the resistance of the car is the factor which determines what work must be done by the motor.

How shall we determine the intermediate gear ratios to enable the motor to properly overcome the variable resistance and yet not exceed its economical or workable speeds?

The ideal curve of tractive effort would appear substantially as shown in Fig. 3. The low-speed reduction in the gearbox should be such as to overcome all the difficulties encountered en route, as well as to reserve enough motor power to accelerate the vehicle at starting. Air resistance can be neglected in first speed calculations because it is so small at moderate speeds.

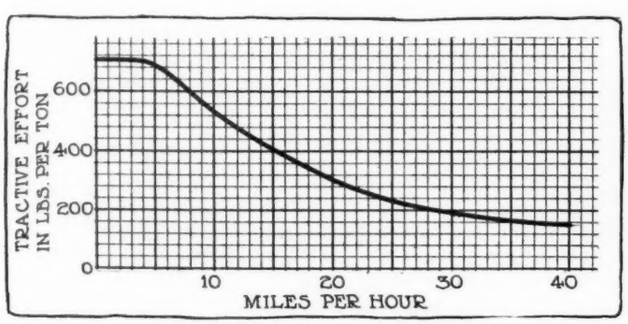


Fig. 3—This curve shows the power that can be exerted by the motor in propelling the car. For example: Fig. 1 shows the power the motor can give, and Fig. 3 shows the proportion of this power that can be applied to moving a car, the remainder of the power being lost in friction. Thus at 10 miles per hour the power exerted by the motor would be 500 pounds a ton in propelling the car, and at 30 miles per hour the power in propelling the car would be 200 pounds per ton, and at 40 miles per hour the power needed for propelling the car would be 150 pounds per ton of car weight. This is because the motor is working faster and its torque, or power curve, falls off

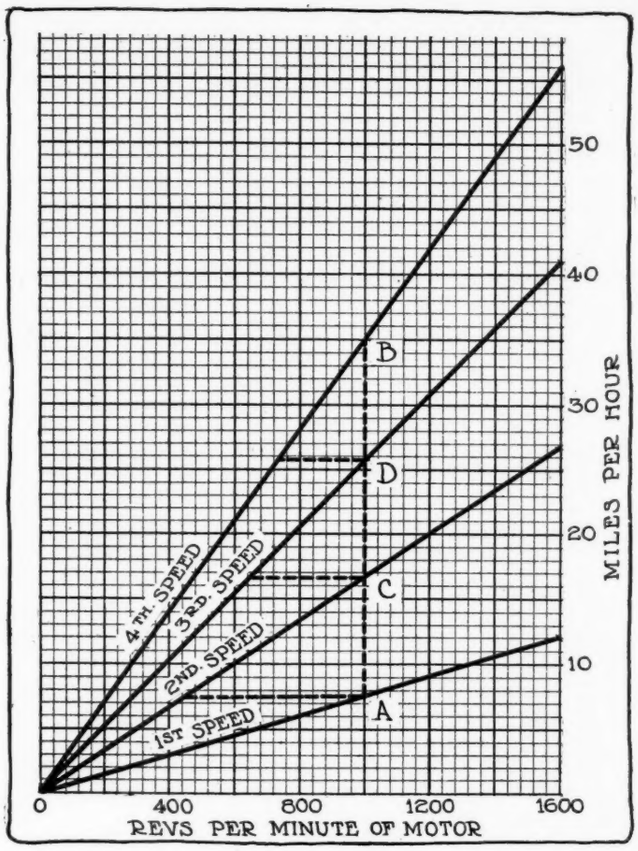


Fig. 4—This curve illustrates graphically how motor speeds must change when shifted. It is a diagram of an arithmetical gearset and shows by the three horizontal dotted lines the changes in speed when going from low to intermediate, from intermediate to third, and from third to fourth. These three dotted horizontal lines are not all of the same length; the bottom one, representing the change in speed of motor when going from low to intermediate, is much longer than the other two. This means, in other words, that there is much greater change in the motor speed when shifting from low to intermediate than from intermediate to third or third to fourth. This difference is not desirable, and the ideal gearset would have the same amount of change in motor speed between low and intermediate as between the other speeds

Let W = weight of loaded vehicle,

t = coefficient of traction,

c = % grade of steepest hills one meets,

R = radius of driving wheels

and T_m = equal turning effort or torque of motor.

Then the resisting force of the vehicle will be

$$F_r = RW(t + c) \qquad (1)$$

If E = the efficiency at the rim of the power transmission mechanism and r the ratio of R.P.M. of the motor and wheels, the available power at the rim will be

$$F_d = rE\,T_m \qquad (2)$$

The force which can produce acceleration will be

$$f = \frac{F_d - F_r}{R} \qquad (3)$$

and the acceleration will be

$$j = \frac{fg}{W} \qquad (4)$$

Substituting in (3) the values of F_r, F_d and f obtained from equations (1), (2) and (4) we have

$$j = g\left(\frac{E\,T_m}{WR}\,r - (t+c)\right) \text{ and } r = \frac{WR}{E\,T_m}\left(\frac{j}{g} + (t+c)\right)$$

If we took $T_m = 184.4$ ft. lbs., $W = 3600$ lbs., $R = 1.46'$, $r = 18$ $(t+c) = 0.2$, $E = .65$

$$\text{then } j = 32.2\left(\frac{.65 \times 184.4 \times 18}{3600 \times 1.46} - 0.2\right) = 6.76 \text{ ft. per sec.}$$

The highest gear ought to permit the vehicle to advance on a moderate road on a level or perhaps up a gentle slope without forcing the driver to change his transmission gearing from high to a lower ratio because of the least difficulty. The highest speed then ought to be serviceable in the great majority of cases that occur. It is necessary, as experience shows, to avoid an exaggerated gear ratio which requires the hand constantly on the change speed lever and which, moreover, is rather a cause of retarding the mean speed than of accelerating it.

In the establishment of the highest speed gearing there is no need of considering the acceleration, but it is necessary to take account of the air resistance which is at its maximum.

Let t' = coefficient of traction,

c' = % of slope.

r_h = the gear ratio,

S = surface of vehicle presented to wind ahead.

V = speed hoped for.

C'_r = the resistant couple.

C_d = the available couple.

We have then

$$C'_r = W\,R\,(t'+c') + 0.0056\,RSV^2$$

and $C'_d = r_h\,E\,T'_m$.

Equating these two expressions, since the acceleration is neglected.

$$r_h = \frac{RW\,(t'+c') + .0056\,SV^2}{E\,T'_m}$$

The graphical illustration of the variation of speed changes can be shown by Fig. 4.

Adopt for the first speed ratio of gearing the ratio 14 as r.p.m. of motor to wheels. For 1000 r.p.m. this gives 7.4 miles per hour as the speed of the vehicle.

Erecting an ordinate at 1000 r.p.m. to meet the horizontal line of 7.4 miles speed gives us a point on the first speed line which can be drawn through the origin and this point.

The same calculation with a gear ratio of 3 gives a speed of 35 miles per hour.

(To Be Continued)

Recent Court Decisions—Defeats Trolley Co

By George F. Kaiser

NEW YORK Court holds in a recent case that, when a person comes out of his house to help his visitors into their automobile and, while standing between the car, which is pulled up close to the curb, and the trolley tracks, is injured by a trolley rapidly approaching, he may collect from the trolley company.

In this case a man was helping a woman into the front seat of an automobile and was standing between the trolley track and the machine, in a space about 3 foot wide. Before he came out into the street he had looked to see if any cars were approaching. He saw none, however, and heard no signal and was unaware of the fact that a trolley was coming until it struck him. The Court said that, the fact that he was standing there from one-half minute to a minute while opening the door of the automobile, did not necessarily mean that he was negligent but that was a question for the jury.—*Breese vs. Nassau Electric R. C.*, 147 *N. Y. Sup.* (*New York*) 416.

Dealer Liable While Demonstrating

Oregon case decided against dealer who was demonstrating a car and teaching a person, who had made a contract to buy, how to run the car.

A person while walking on the street was run down and injured by an automobile which was driven by a salesman employed by a dealer. The car at the time the accident occurred was being driven by a man who had contracted to buy it. The salesman had just given him a demonstration and at that time was acting as his instructor, showing him how to operate the car. The injured person brought suit for $40,866, and sued both the dealer and the buyer. The jury first returned a verdict of $2,750 against the buyer and $5,250 against the dealer. The court refused to accept this verdict, however, telling them that it could not split up the damages that way, holding one party for one-third of the damages and the other for two-thirds. The jury thereupon retired again and on returning gave a verdict against the dealer for the entire amount. The dealer appealed, but the Court held that as it was understood that the buyer was to be taught to run the car by the dealer, and the person in charge of the car, though not actually operating it at the time of the accident, was one of the dealer's salesmen, the verdict of the jury should not be disturbed and held that the judgment for $8,000 against the dealer was right and proper. —*Holmboe v. Morgan, et al.*, 138 *Pac.* (*Oregon*) 1084.

Collects from Bus Driver

A radiator of an automobile which has been injured in a collision may be brought into Court and introduced as evidence, providing it is shown that it is in the same condition when brought into Court as it was immediately after the accident.

In a recent Iowa case, suit was started for damages on the claim that a bus driver had negligently run the tongue of the bus through the radiator of an automobile and bent the lamps, lamp brackets, fenders, hood and the fan of the car; $117.95 damages were asked. The jury gave the automobile owner judgment for $75 when the radiator which had been damaged was brought into Court and introduced as evidence. The owner of the bus objected to the radiator being brought in, but the Court held that it was properly admitted.—*Neel v. Smith*, 147 *N. W.* (*Iowa*) 183.

Motorist Fails of Recovery

Washington Court says that when an automobile approaches a street car crossing its driver must make a reasonable use of his senses for his own safety and he is negligent if he is not on the lookout for cars at a point where he can determine if he can get across safely and if an automobilist approaching a crossing takes his last look for cars when 150 feet away, the Court further declared, he is guilty of contributory negligence.

In this case a motorist sued for personal injuries caused in a collision with a street car at a crossing. The automobile was found to have approached the street car at a speed of 20 miles per hour, with its side curtains up and the Court held accordingly that the motorist was guilty of contributory negligence and dismissed his case against the railroad.—*Bowden vs. Walla Walla Valley R. R. Co.* 140 *Pacific* (*Washington*) 549.

Plug Location Has Little Effect

Difference Between Power Curves Produced with One and Two-Point Ignition Also Slight According to Latest Experiment

THERE have been endless experiments to determine the difference made in the power produced by a motor with one or two sparks or with the plug located in different parts of the cylinder. These experiments are always of interest because they vitally effect the user of the car by determining for him whether or not it is possible to secure a greater amount of power out of the same size motor. The latest experiment in this line shows a very little difference between the power produced when the plugs are located over the intake or exhaust valves and also but slight change when a two point instead of a single point ignition system is used. The experiments have been performed by C. F. Dendy Marshall and are reported in *The Autocar*. The report follows:

"It is, I think, a foregone conclusion that, given a good spark, neither duplicating it nor changing its position, can give more than quite a small increase of power. I recently suggested, and took part in, a trial which throws some light on both these points. A six-cylinder engine was put through three sets of brake tests under precisely the same conditions —(A) with single sparking plugs over the inlet valves, (B) with double plugs in series, one over each valve, and (C) with single plugs over the exhaust valves. As the engine was a new one, and had not been brought up to its full power, it would not be fair to mention the name and dimensions, but, of course, the comparative value of the tests remains.

Compression Space Kept Constant

"There were two plugs in each cylinder all through, in order that the compression space should not be varied, one set being disconnected during the first and third series of tests. The extra plugs were of the double pole variety. This is necessary, because the ordinary plug discharges to the cylinder, so in order to obtain two sparks the current must enter and leave by the first plug without being "grounded," passing on to the next one. This in effect forms the old gap system, which was thought a good deal of ten or twelve years ago, only in this case the gap is inside the cylinder instead of outside.

"The following are the figures obtained, each one being the average of four observations taken during the course of a minute. No significance need be attached to the fact of the first one in Test 3 being just above the corresponding figure of Test 1, as the difference is so small, and was probably either due to errors of observation, or to a slight irregularity in the running of the engine.

Revs. per minute	800	1,200	1,600	2,000
B.H.P. Test A	26.9	32.8	40.2	43.5
B.H.P. Test B	21.4	33.3	40.5	43.7
B.H.P. Test C	21	32.6	39.4	42.6
Approximate percentage of difference of power.				
Test B over A	2½	1½	¾	⅛
Test A over C	..	⅔	2	2¼

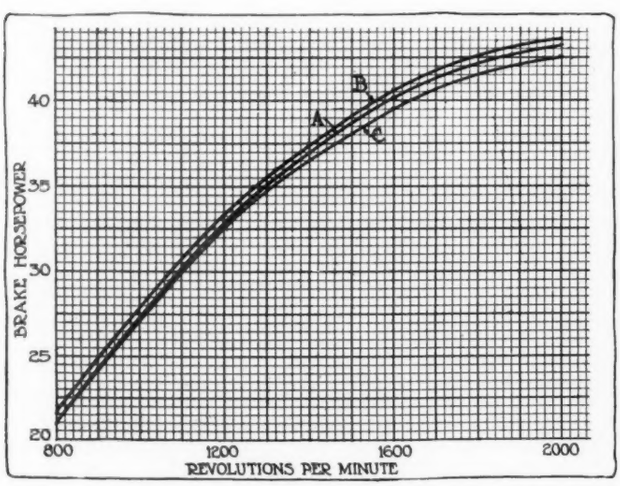
Two Plugs Are Unnecessary

"The results of the three sets of tests are plotted in the accompanying curves. On the whole, the conclusion seems to be that two plugs are hardly worth having. In the engine under test the advantage of double ignition is more marked at slow speeds, being quite negligible when the engine is running hard. On the other hand, the position of a single plug becomes of greater importance as the speed increases.

"The engine I experimented with was of the fashionable type, with all the valves on one side. In "The Gas, Petrol, and Oil Engine," by D. K. Clerk and G. A. Burls (vol. ii.), a similar test with a T-headed engine is mentioned on page 337, which was carried out by Professor Watson, the results being:

R.P.M. of engine	1,100	1,600
H.P. single ignition	18.4	26
H.P. double ignition	20.8	29.2
Difference	2.4 (12%)	3.2 (10%)

"In this case the advantage is increased with the speed, though not the percentage of improvement. It seems that the double plug arrangement has much more effect when the valves are on opposite sides than when they are on the same, owing probably to the two points of ignition being farther apart, and perhaps partly to the fact that the charge is symmetrically fired."



Three curves of brake horsepower under different spark plug conditions: A, with single plug over the intake; B, with double plugs in series, one over each valve; C, with single plugs over the exhaust valves

Los Angeles Has Kelly-Springfield Buses

The bus lines which are to be operated by the Pacific Motor Coach Co., Los Angeles, Cal. between Los Angeles and various nearby cities will use, 3.5-ton trucks, made by the Kelly-Springfield Motor Truck Co., Springfield, O., and fitted with bodies built by the St. Louis Car Co., St. Louis, Mo.

The maximum speed will be between 18 and 20 miles per hour, and the buses have a seating capacity of 54 passengers, sixteen being housed in the closed compartment of the lower deck, eight in the open compartment, and thirty on the upper deck.

Chassis Is Stock 3.5 Ton

The chassis used is a stock 3.5-ton design fitted with 6-inch dual rear tires and specially heavy axles. The motor is a four-cylinder water-cooled type, suspended on three points. The cylinders are T-head, cast in pairs and the bore and stroke is 4.5 by 6.5 inches. Speed changes are effected through a three-speed sliding gearset.

It is also expected that the Pacific Coach Co. will have the concession for motor transportation within the ground of the Panama-Pacific Exposition.

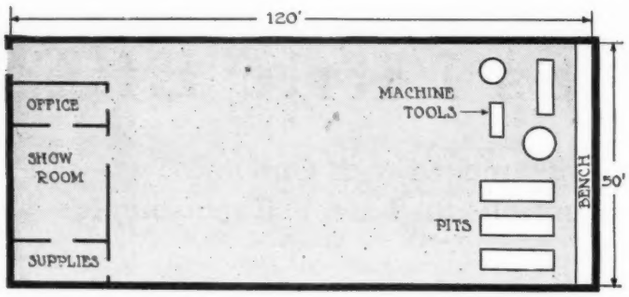


Fig. 1—Plan for one-story garage with salesroom

The Rostrum

Two-Cycle More Flexible When Skilfully Adjusted

EDITOR THE AUTOMOBILE:—Seeing by the recent letters in THE AUTOMOBILE that many of the readers are friendly to the two-stroke cycle motor, I have had revived in me my old-time two-cycle enthusiasm which I had when I used to sell Elmore valveless cars. Let it be said, in all truth, that while many cars cost more and looked better, I have yet to see the first four-cycle car excel in performance or in fuel economy.

The last 50 horsepower car turned out by the factory is running in Tampa today and is giving its owner 13 miles to the gallon of gasoline after having it fitted with special equipment. This car is a 1912 model.

To the man who has had a wide range of experience in the several types of automobile motors, the assertion often made by well-meaning four-cycle advocates, that the four-cycle is more flexible than the two-cycle, is really amusing, but is true enough in the hands of a four-cycle driver.

It has been my experience that the average good four-cycle driver is apt to make a poor two-cycle driver—it is a good deal like learning the two-step before the waltz.

To get flexibility out of a two-cycle one has to be a good carbureter adjuster, changing the mixture as the load and speed varies. The use of a well-trained ear helps wonderfully; I think the skillful operation required is the biggest factor that has worked to keep the two-cycle in the background as far as automobile service is concerned.

In France the two-cycle is making progress. Especially is this true of the four-cylinder Koechlin, which has a bore and stroke of 3.3 by 5.9 inches, producing a piston speed of 3000 feet per minute and developing 110 horsepower. This motor has no crank-case compression; in fact, I do not know of any of the best motors that do have it. With Europe developing the two-cycle it looks as though it may yet come to the front.

Tampa, Fla. L. C. HANNA.

Planning One-Story Garage

Editor THE AUTOMOBILE:—We are planning to build a one-story garage of brick, 50 by 150 feet, and we would like to receive suggestions from you as to the general layout and inside finishing for the stock room, show room and office.

Grafton, W. Va. B. M.

—In laying out the garage you should put the show room and offices at the front and the benches and machine tools across the back of the structure. The rest of the space should be devoted to storage. A plan is shown in Fig. 1.

How much space should be given to the show room and the supply store depends entirely on how many models you plan to carry and how great a stock of accessories you intend to display.

In general a 20-foot strip across the front of the building, with a space at one side for the entrance of cars to the garage, should be large enough. The offices should be placed next to the entrance, and at the other side of the structure put the supply store, with the space in between for the display of cars.

The office should be placed next to the entrance so that the same clerk can check the cars as they go in and out that attends to the office.

In the large central space the cars can be displayed to best advantage. The space devoted to accessories should be separated from the show room by a railing, and the office should be similarly partitioned off.

The finish can be almost anything desired. For instance, you might use a good hardwood floor, such as maple, oak or parquet. The trim may be any of the woods used in house construction, such as oak, chestnut, cypress, and the walls can be papered, painted or paneled, according to your taste and the amount of money you have at your disposal.

The repair of cars should be done at the rear of the building, as the best light will be here, and also this arrangement allows an unbroken space in between for car storage. Place the machine tools at one side, back of the benches, and on the other side arrange two or three pits. The roof should have plenty of skylights, and the walls of the garage should be strong enough to allow the addition of a second story at some later date.

Wants Quieter Valve Action

Editor THE AUTOMOBILE:—1—I would like to put a quieter valve action into my 1911 car. It has the square head or mushroom type of valve now. Could the roller tappet type of the Packard 18 be applied? If so, could I use the regular Packard cams or would a new set have to be made? In the Cadillac the valves are all on same side, while in the Packard the inlet valves are on one side and the exhaust on other. Would this make any extra difficulty?

Plattsburg, N. Y. S. D. B.

—1—We would not advise you to change from mushroom to roller followers, as there is very little actual difference in the noise produced by these two designs. The former should be quiet enough to satisfy the most exacting motorist, providing the valve mechanism is not unduly worn and is in proper adjustment.

The side thrust of the cam on the follower face, Fig. 2, as the valve mechanism is lifted, produces unequal wear on the valve guide. In time this wear is sufficient to cause a noticeable amount of noise, due to the push rod being slapped up against one side of the guide every time the cam moves the mechanism. The remedy is to put in new valve guides.

Another place that noise frequently occurs is between the end of the valve stem and the push rod. If there is any great amount of space between these two members a clicking noise will be produced. This can be largely eliminated by adjusting the nuts on the top of the push rod. A piece of carbon on the valve seat will also cause a valve to be noisy.

Another cause of noisy valves, that has been suggested, is produced by the sticking of the valves.

However, if you decide to attempt to make the change to roller cam followers you will not be able to adapt Packard cams but will have to make a special design. It is doubtful also whether even then will it be possible to use rollers because of lack of room.

Wants Hunting Body with Bed

Editor THE AUTOMOBILE:—Is there a car body made for hunting? One so arranged that the back of front seat may be turned back against the rear seat of the car, forming a bed?

Bakersfield, Cal. THOMAS SCOTT.

Such a body can probably be obtained from the Spaulding Mfg. Co., Grinnel, Ia., maker of the Spaulding car. This concern fits the body illustrated in Fig. 3. The back of the front seat folds down and exactly fills the space between the front and rear seats. The back is held in position by two knurled head bolts. This equipment may be supplemented by a reading lamp and an air mattress, which is inflated by the power tire pump.

Another design is that shown in Fig. 4. This bed is made of heavy canvas, with a hem at each end, through which stretcher bars run. To the ends of these bars are fastened the front and rear supports, which are secured to their respective springs by means of ropes. When not in use the bed is rolled around the stretcher bars and made into a handy package.

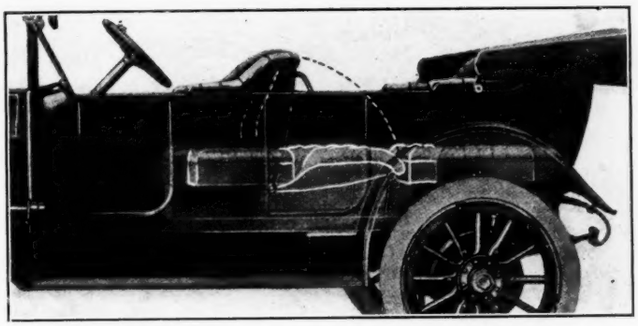


Fig. 3—Spaulding car that can be used for a bed

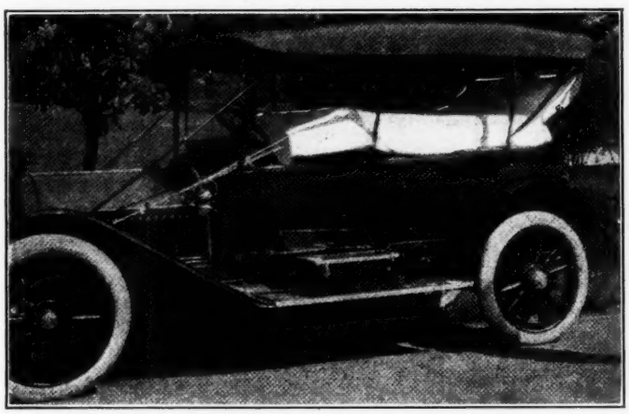


Fig. 4—Bed that is suspended over seats

Two, Four and Six-Cycle Motors

Editor THE AUTOMOBILE:—1—Please explain in next issue of THE AUTOMOBILE the proper way and easiest way to time a two-cycle, a four-cycle and a six-cycle motor.

2—Explain the different ways they fire and the difference it makes in timing the valves.

3—Give sketch and explain how to adjust a carbureter, especially the Schebler and Rayfield and a few more of the standards.

H. A.

Anniston, Ala.

—1—From the way you have asked these questions it is evident that you have not a correct understanding of the word "cycle" and that you have confused it with the number of cylinders a motor has. A cycle is the occurrence of a series of events at regular intervals. You might consider that the seasons, Spring, Summer, Fall and Winter form a yearly cycle.

In the same way gasoline motors are described as two-stroke cycle, four-stroke cycle or six-stroke cycle, depending on whether it takes two, four or six strokes of the piston to perform the complete set of functions necessary to produce an explosion. Thus in a two-stroke cycle, or a two-cycle motor, as it is more commonly known, the gas is forced into the cylinder when the piston is at the bottom of the stroke, is compressed as the piston moves upward and is ignited when the piston reaches the top of the stroke. Then on the downstroke the explosion occurs. When the piston reaches the lower end of the stroke the exhaust port is uncovered and the burnt gases escape.

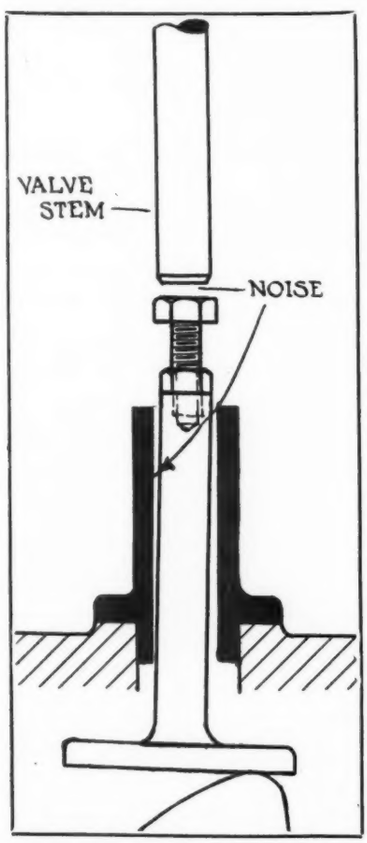


Fig. 2—Diagram of valve mechanism showing where noise occurs

In the four-cycle motor, on the first stroke the piston moves out and sucks in a charge of mixture, then on the second stroke the piston moves back again and compresses this charge. At the end of this stroke ignition occurs, and then as the piston moves out on its third stroke the gases expand. On the fourth the piston moves in again and forces the burnt gases out into the exhaust pipe.

Six-cycle motors are rare and have never been brought beyond the experimental stage. One that was suggested a few years ago had the following cycle, beginning with the explosion stroke: With the piston at upper dead center, at the end of the compression stroke, a small pump injected the correct quantity of fuel, and combustion took place. Following this there was a long expansion stroke, and then the exhaust stroke occurred. On the third stroke a charge of cold, clean air was sucked into the cylinder and was exhausted on the fourth stroke. More cold air was drawn in on the fifth stroke, while on the sixth compression of this air occurred. It will be noted that during three of the strokes, or one-half of the time, the cylinder was filled with cool air, and it was planned to use this means to cool the motor, no exterior ribs or any other influence being employed.

2—The ordinary two-cycle motor does not need to be timed, as the ports are automatically uncovered by the piston.

The operation of the two-cycle motor will be made clear by referring to Fig. 5. The gas is first drawn into the crankcase and then it is transferred under a pressure of 2 or 3 pounds to the combustion chamber. The left illustra-

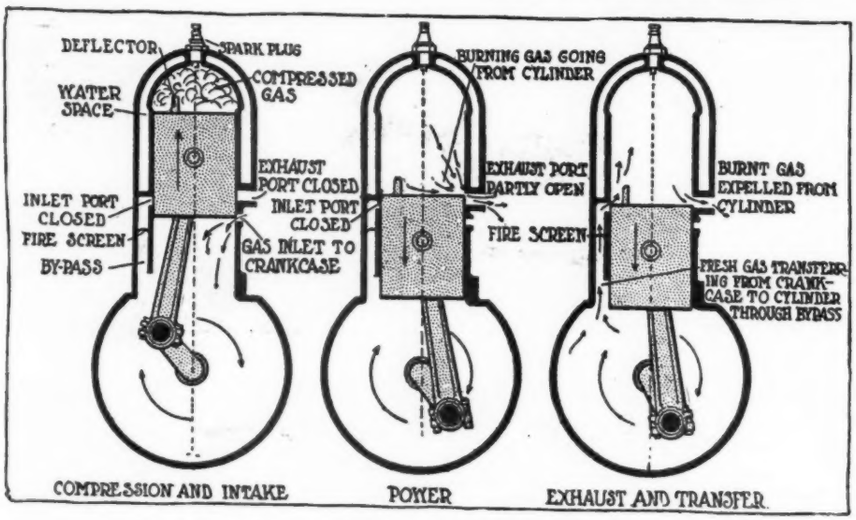


Fig. 5—Diagram showing operation of two-cycle motor

tion shows the piston nearing top dead center. The gas in the combustion chamber is being compressed and the upward movement of the piston has just uncovered the gas inlet port to the crankcase. At the moment that this port is opened the pressure in the crankcase is slightly lower than atmosphere, because the piston has moved upwards and thus increased the volume of the crankcase chamber, the increase of volume being accompanied with a reduction in pressure, since the quantity of the gas in the chamber remains constant while this is occurring.

The slightly lower pressure in the crankcase when the port is opened causes an inrush of gas from the carbureter.

When the piston reaches top dead center the spark ignites the gas and the piston is driven out on its expansion stroke. As it nears the lower end of its travel, as shown by the center diagram, the exhaust port is uncovered and the burned gases flow out. This downward movement of the piston also compresses the gas in the crankcase, so that when the inlet port into the cylinder is uncovered, shortly after the exhaust port, a fresh charge of gas is transferred to the combustion chamber. This is illustrated at the right.

It will be noted that there is a baffle plate on the top of the piston, which deflects the gas upward to the top of the cylinder so that the entering gas flows up one side of the cylinder and down the other. This action helps force any exhaust gas, that remains, out. A fine wire screen is placed in the by-pass to prevent a back fire from exploding the gas in the crankcase.

Timing of Four-Cycle Varies

2—Since there are no valves in the ordinary two-cycle motor, there is no timing to be done when the motor is put together, it merely being necessary to attach the pistons, connecting-rods and to put on the cylinders. The times of port openings and the length of opening can be varied to a certain extent by varying the width of the ports. For instance, referring to Fig. 5, it will be readily seen that if the exhaust port is made .75 inch wide the port will be opened sooner by the downward movement of the piston than if the port width is .5 inch.

The method used in timing a four-cycle motor all depends on conditions, although the object in any case is to so set the camshaft, which is positively driven from the crankshaft, that the valves will be opened and closed at the proper moments with reference to the positions of the pistons, and the only time you should have to do this is after taking the motor apart.

As a rule there is a mark on one of the teeth of the camshaft gear and another on the crankshaft driving gear, and if these two gears are set so that the two marks come together the motor will be correctly timed, providing the gears are properly attached to their respective shafts.

If there are no such marks, or if their correctness is to be tested, then the camshafts should be set so that the valves will open to correspond with the marks on the flywheel. Suppose, for example, that the motor is a T-head design with camshafts on opposite sides, one for the inlet and the other for the exhaust valves. Then there will be marks on the flywheel for the opening of the intake valves and others for the opening of the exhaust valves.

It is only necessary, however, to time one cylinder. If the intake and exhaust valves for cylinder No. 1 are correctly set, the timing of the other cylinders will be correct, because the camshaft moves as a unit.

Therefore, turn the motor over until the mark for the opening of the intake valve on this cylinder, Fig. 6, is at the top and then mesh the camshaft with the crankshaft gear in such a way that the intake cam will be holding the push rod tight against the end of the valve stem. Do likewise for the exhaust valve.

If there are no markings on the flywheel, and it is necessary to time the valves, place one of the cylinders on dead center and determine where these markings should be. To do this it will be necessary to know when the valves should open and close, and this may be found from the instruction book. It may be expressed in degrees, inches of piston movement or in inches measured on the flywheel.

With No. 1 piston on upper dead center, measure off from the top of the rim the number of degrees or inches on the flywheel rim to the mark that indicates the opening of the intake valve of this cylinder. With this mark established, turn the motor until this mark is on top, and then proceed as when this has already been determined by the maker.

If the timing is expressed in inches of piston travel, then the intake valve of cylinder No. 1, for example, should open

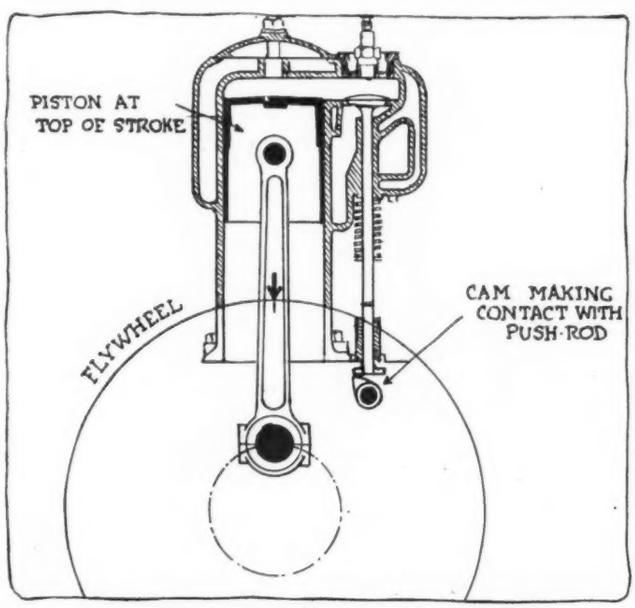


Fig. 6—Diagram showing how valves are timed

when the piston has moved out on its stroke .25 inch. Turn the crankshaft until the piston is this distance below top dead center and then put the camshaft in position.

3—Carbureters are so different in their methods of adjustment that it is impossible to describe the adjustment of more than one model of each of the makes that you mention.

How To Adjust Rayfield

When adjusting a Rayfield carbureter, Fig. 7, bear in mind that all adjustments are turned to the right for a richer mixture; the automatic air valve requires a very light spring tension. Before adjusting the carbureter be sure there are no obstructions in the gasoline line; that manifold connections are absolutely tight and free from air leaks; that valves and ignition are properly timed, and there is a hot spark and good compression in all cylinders.

Set the automatic air valve so it seats lightly but firmly. With throttle closed and dash control down, close the nozzle needle by turning the low-speed adjustment to the left until block Y slightly leaves contact with the cam M. Then turn to the right about one and one-half turns. Open the throttle not more than one-quarter. Prime the carbureter by pulling steadily for a few seconds on the priming lever G. Start the motor and allow it to run until warmed up. With retarded spark, close the throttle until the motor runs slowly without stopping. Turn the low-speed adjustment to the left one notch at a time until the motor idles smoothly. If the motor does not throttle low enough, turn the stop arm screw A, to the left until it runs at the lowest number of revolutions desired.

Then advance the spark about one-quarter and open the throttle rather quickly. Should the motor back-fire it indicates a lean mixture. Correct this by turning the high-speed adjusting screw to the right about one-quarter turn at a time until the throttle can be opened quickly without back-firing. Should the motor not back-fire, turn the high-speed adjusting screw to the left until it does. Then turn to the right until the motor runs smoothly and powerfully.

Adjustments made for high speed will in no way affect the low speed. Should the motor back-fire or the mixture be lean at intermediate speeds, after high and low-speed adjustments have been made, turn the air valve adjustment P to the right, a notch at a time, thereby decreasing the air supply and enriching the mixture. Use all the air possible, for economy.

The low-speed adjustment must not be used to get a correct mixture at intermediate or high speeds. The automatic air valve should always be seated when the motor is throttled down to its lowest speed.

Before starting the motor when cold observe the following instructions: Open the throttle not more than one-quarter (if opened more starting will be difficult); enrich the mixture by pulling up the dash control; prime the carbureter well by pulling on priming lever G for a few seconds. When stopping the motor pull up the dash control. Open the throttle about one-quarter and switch off the ignition. This leaves a rich mixture in the motor, which insures easy starting.

How Schebler Model R Is Adjusted

The model R Schebler, Fig. 8, is a single jet raised-needle type of carbureter, automatic in action. The air valve controls the lift of the needle and automatically proportions the amount of gasoline and air at all speeds.

It is designed with an adjustment for low speed. As the speed of the motor increases, the air valve opens, raising the gasoline needle, thus automatically increasing the amount of fuel. It has but two adjustments—the low-speed needle adjustment, which is made by turning the air-valve cap, and an adjustment on the air-valve spring for changing its tension.

Easy starting is secured by an eccentric which acts on the needle valve. It is intended to be operated either from the steering column or from the dash. It raises the needle from the seat and an extremely rich mixture is furnished for starting and for heating up the motor in cold weather. A choker in the air bend is also provided.

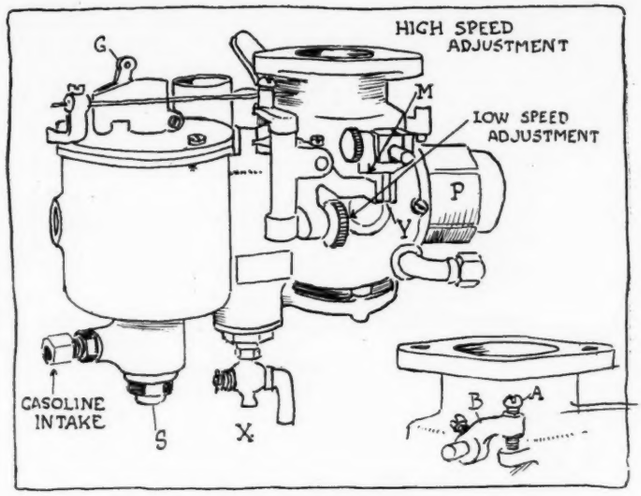


Fig. 7—Rayfield carbureter showing adjustments

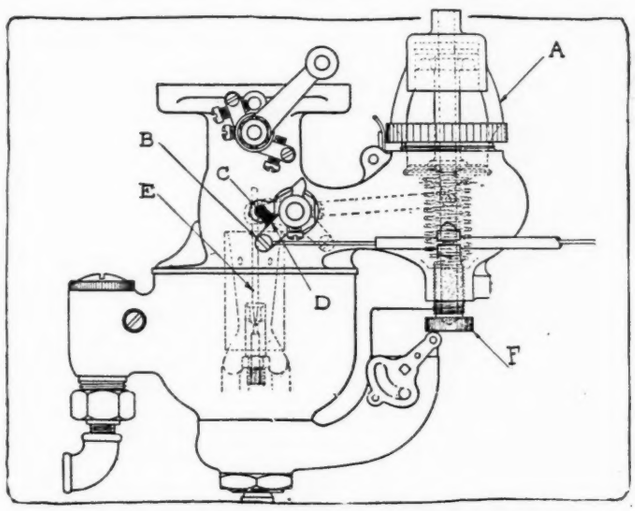


Fig. 8—Schebler carbureter showing points of adjustment

When the carbureter is installed see that lever B is attached to steering column control or dash control, so that when boss D of lever B is against stop C the lever on steering column control or dash control will register lean or air. This is the proper running position for lever B.

To adjust the carbureter turn air valve cap A clockwise or to the right until it stops, then turn it to the left or anti-clockwise one complete turn.

To start the engine open the throttle about one-eighth or one-quarter way. When the motor is started let it run till the engine is warmed, then turn the air-valve cap A to left or anti-clockwise until the engine hits perfectly. Advance the spark three-quarters the way on quadrant; if the engine back-fires on quick acceleration turn the adjusting screw F up (which increases the tension on the air-valve spring) until acceleration is satisfactory.

Turning the air-valve cap A to the right or clockwise lifts the needle E out of the nozzle and enriches the mixture; turning to the left does the reverse.

When the motor is cold or the car has been standing move steering column or dash control lever towards Gas or Rich, which lifts the needle E out of gasoline nozzle and makes a rich mixture for starting. As the motor warms up move the control lever back gradually towards Air or Lean to obtain the best running conditions, until the motor has reached the normal temperature. Then place the lever at Air or Lean.

Why the Industry Flocks Westward

An Analysis by Noted Engineer of the Reasons Which Compel Ambitious Builders of Automobiles, and in Lesser Degree the Makers of Parts and Accessories, to Seek Locations Where Their Efforts Are Upheld and Strengthened by a Multitude of Favorable Industrial and Financial Currents

An Appended Opinion on the Light Cars of the Future

From an Interview with Hiram Percy Maxim by M. C. K.

NOWHERE have more attempts been made at starting automobile manufacture than in New England, and nowhere have the results been less in proportion to the expectations. The accompanying map shows a dot for every factory that has been abandoned. Each of them testifies that the desire to make automobiles has been entertained by individuals. The scale on which New England is engaged in other industries and enterprises bespeaks a disposition which in automobile manufacture should have led to production counting up in numbers as high as anywhere else in the country if the conditions had been favorable. New England always had plenty of capital, hosts of capable machinists and other mechanics, all the financial grit needed for tackling new problems and all the persistence required for solving them.

Why, then, does not New England today produce more than 1 per cent. of the automobiles made in the United States? And why does any proposition to locate a new factory in New England, or to revive an old one, meet with a chilly reception among the financiers of that section? Why, on the other hand, does the manufacture of automobile accessories and of special machinery with which to make automobiles on the Western scale prosper much better in New England than the manufacture of the automobiles themselves?

These questions which have a bearing not only on the past but also on the future, whenever the matter of locating a manufacturing plant is involved, seem sufficiently interesting to justify an attempt to get them answered as authoritatively as possible, so much more as the answer might throw light on similar questions in other sections of the country. The cyclecar movement, among other radical factors in the present situation, might, for example, easily call for the establishment of new factories, and New England, New York State or Pennsylvania might seem to afford excellent opportunities for opening up new manufacturing business, as the chances for a thriving local trade, to help the beginning, apparently would be brighter there than in the Middle Western territory where factories abound. Also, the fact that export trade on Europe, South America and Asia looks promising, and would be a welcome filler to even up the fluctuations in the home demand, beckons the new concern to an eastern location.

A man who seemed particularly well qualified to shed light on any questions asked in this connection was found in the person of Hiram Percy Maxim, whose work as designer and builder of automobiles dates back to the very beginnings of the industry and who has been located in the midst of all the New England industrial currents and cross-currents almost without interruption ever since, while still maintaining close touch with friends, associates and subordinates who drifted West and followed the rising tide of automobile manufacture in Cleveland, Detroit and other bustling centers for the new activity.

A visit at the Maxim Silencer works at Hartford did not fail to elicit the expected ideas, clear and definite, on the subject.

Prosperity the Main Obstacle

"New England is too prosperous in other lines. If New England were finding it harder and harder every year to make money, the situation might be different. But this is not the case, not yet. For every plan to make a big success of automobile manufacture, the New England business man counters with a plan for making a bigger success in finance or insurance or in some of the old established industries, on a much smaller investment and on lines with which he is familiar. New England is making more money on these lines than ever before."

"Still the many who have started must have had an idea of continuing," it was suggested.

"But when it came to the point, in each case, of doing what should be done, to improve, to enlarge to meet competition, the helping hand which is extended so freely in the West was not found; it was engaged in other directions."

"You don't think that the mechanics of this section are too capable along fixed lines, too conservative and averse to new modes of working? Or that there is a scarcity of hands to tend automatic machine tools."

"The mechanics are all right. The trouble is with the investors.

"The mechanics as a rule are full-skilled and full-paid, to be sure, and there has not in this line of work been much employment for the class of factory hands whose only skill consists in tending special machinery, but this is because the manufacture of automobiles here in most instances has not advanced to the point of organization at which highly specialized machines could be bought.

Successes No Longer to Be Duplicated

"New England makes special automobile machinery but it is sold elsewhere. The orders come from other parts of the country. And things have changed. A concern like that of Pratt & Whitney, which I started, could not be started now, successfully. Billings and Spencer have doubled their business three times over, since automobiles began to be made, but no other similar concern could do the same now from a New England location."

Different Situation of Partsmakers

"To what do you ascribe the fact that New England continues to succeed in making automobile parts on a large scale?"

"A concern starting in to make a certain part selects one which it can make with the equipment it has. There is no new investment. The concern is bigger than the new business it undertakes from the beginning. Later, if the partsmaking end of it grows to be the main thing, enlargements and improvements can be made out of the profits, and they know then what they are doing. New England business men are not slow; not so slow that they won't buy new ma-

chinery if they can see the need of it plainly and no better use for their money, but they are certainly loath to throw old machinery on the scrapheap. The partsmakers usually can find a place for the old machines which have served them in the past, even if they have to install new machines as well."

The Force of Example

"Is there going to be any change in this whole condition?"

"How can there be?" it came quickly from Mr. Maxim, "it is logical. It is easier to go West and find suitable conditions. People follow the lines of smallest resistance. Nobody can afford to spend more than half of his energy in overcoming the drag. The force of example is against you instead of for you; and it is powerful. Let me mention an instance. In 1902, when air-hardened tool steel was still a relatively new thing, I was out at the Pennsylvania Railway shops at Altoona where they had just installed a high-speed lathe. It cut big clean red-hot shavings, bigger than any of the workmen had seen before and faster, much faster, the cutting edge of the tool red-hot too, and the men gathered around the machine to watch it, whenever they could. Its new efficiency impressed them deeply, and they went back to their benches or their machines and worked with much greater energy than before. They simply could not work at the old slow gait with that lathe setting another example before them every day. There was a clear gain of 100 per cent. in the speed of all the workers in that shop, and they tell me that this advancement was maintained ever afterwards. So much for one single example, and an inanimate one at that."

The Money Not All

"Could a Western man or set of men with liberal ideas and sufficient capital come here and organize automobile manufacture on a large scale, starting with small and cheap cyclecars, for example, and developing a simplified type of automobile in which New England might come to excel?"

"Perhaps, but I don't think they could. At least they could do better by placing their plant in the midst of helpful surroundings, with the rest of their community, as well as neighboring communities, interested in the success of automobile manufacture and anxious to help pushing. The ambitions of New England, on the other hand, run in the directions where the biggest money is made now by New Englanders. Changes in this come hard."

"To show the difference in the spirits of things," Mr. Maxim continued, "I will mention another example. The agent for a spotwelder recently came to a St. Louis concern where a great deal of riveting was being done on stoves and convinced them that they could save $25 per day and get the work done better with a spotwelding machine. With riveting, you know, there is a lot of waste work in indexing the holes. 'Will I have it sent by express?' the agent asked. By express! a machine weighing 700 or 800 pounds. The charges would be $100, how ridiculous! 'Why not?' responded the agent, 'you save 10 days in time over fast freight. At $25 per day that is a loss of $250. Deduct $100 for express charges and you are still $150 ahead.' In five minutes the St. Louis concern had placed the order, to be shipped by express. The same agent shortly afterwards made a thorough demonstration with a similar concern in ———, here in New England. The order was placed, but when it came to the question of shipment, though the conditions were parallel, the New England firm rebelled vigorously. To pay $100 to an express company for a bit of transportation which could be done for one tenth of that sum was against all sense and precedent, whether it looked like a saving or not. It could not be done. And it was not done. This difference between the West and New England crops out at every turn. It seems to be in the blood here; yet, when a New Englander goes West he gets into the new spirit in a week."

Other examples were mentioned, so actual that they cannot be detailed, but tending to show how very loath the prosperous New England concern is to scrap any part of the machinery which is still in working order and with which he is able to make profits so long as no modernized competition has gained headway. Government contracts and much other profitable work still find their way to New England firms which have the prestige of an industrial position of long standing but whose equipment is antiquated.

"It seems that the New England industries need Taylorizing," suggested the interviewer, "if they shall keep permanently ahead, in other lines than automobile manufacture."

"There is an entering wedge in the Taylor system and the manner it is being advanced," Mr. Maxim thought, "which seems rather congenial to the New England spirit. It is taken up in several places here. Still, that is a long road."

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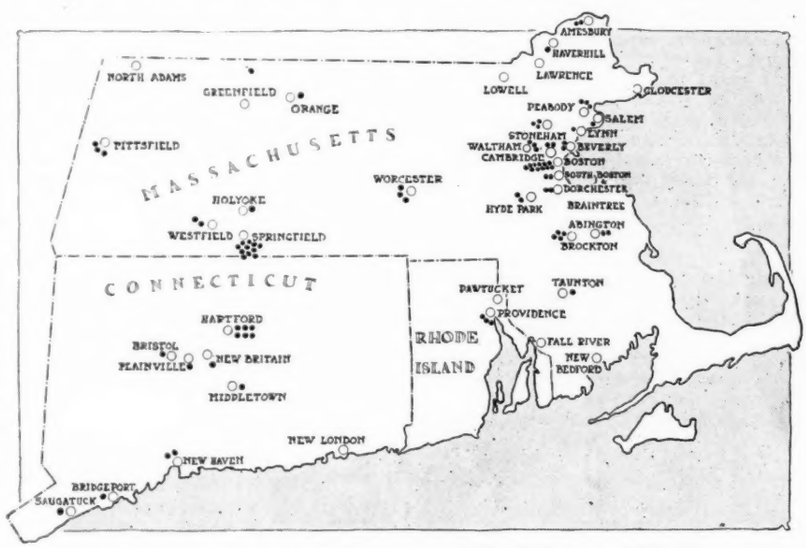
During this discourse, all the while he was gaining a



EACH BLACK DOT INDICATES ONE ABANDONED AUTOMOBILE MANUFACTURING ENTERPRISE IN OR AT THE TOWNS MARKED ON THE MAP

Early experimental plants, such as were maintained at North Adams, Greenfield, Melrose, Mass., at New Haven, Danbury, Conn., and at many other places before the year of 1902 are not included in the map. The names identified with the abandoned factories recall many a worthy industrial struggle, as follows: In **MASSACHUSETTS: Boston**—American Automobile and Power, Lyman & Burnham, Radford, Richmobile, Sturdevant-Mill, Razoux, Napier, Ariel, Essex, Bay State, Holmes. **Springfield**—Warwick, Knox, Automotor, Springfield Automobile, Morse, Rogers, Knox Truck, Atlas, Bailey, Med-Bow, Sultan. **Abington**—Lamson, Buffum. **Brockton**—Motor Cycle, American Motor, Cameron, Roader. **Waltham**—Waltham, Metz, Metz Company. **Cambridge**—Crest, Berkshire Motors. **Westfield**—Loomis, Westfield Motor Truck. **Hyde Park**—Robinson, Pope-Robinson. **Orange**—Grout. **Worcester**—Morgan, Morgan Company, Morgan Motor Truck. **Pittsfield**—Berkshire, Alden Sampson, Stilson. **Amesbury**—Boston and Amesbury, Crown. **Stoneham**—Phelps, Gray & Couch, Shawmut. **Beverly**—Upton, Cameron. **Dorchester**—Clark, Crest. **Salem**—Locke Regulator. **Holyoke**—Matheson. **Taunton**—Taunton Motor Carriage. **South Boston**—Gilmore Electric. **Lynn**—General Electric (automobile department). **Peabody**—Vaughn, Corwin, American Coulthard. **Haverhill**—Hill. In **CONNECTICUT: Hartford**—American Cycle, Electric Vehicle, Law, Maxim & Goodridge, Columbia, Kelsey. **New Britain**—Corbin (automobile department). **Middletown**—Eisenhuth. **Plainville**—Bristol. **Saugatuck**—Toquet. **Bridgeport**—Ariel. **Bristol**—Bristol Engineering Company. In **RHODE ISLAND: Pawtucket**—United Motor Corporation, Brown Machine. **Providence**—Builders' Iron Foundry, "Alco," Page. At **Rumford,** Maine—Bonton.

new and clear view to explain why the automobile industry has flocked, and continues to flock to the West, the interviewer could not help being impresed with the sturdy ability which must have been displayed in the automobile manufacturing concerns in New England—with which the States of New York and Pennsylvania perhaps should be included—that after all have managed to fight winning industrial battles without falling in with the helpful tide of the westward current, compelling respect and patronage on the strength of individuality of design and construction.

Another matter suggested itself. The occasion for getting the opinions on the future from one whose judgment has been matured under these severe conditions could not be neglected. In consequence, Mr. Maxim was plied with more questions relating mostly to those things which are radical and prospective in automobile design. The answers, bound to be rendered in a limited space, had to be given word for word, so as to convey nothing more and nothing less than that for which Mr. Maxim would assume the responsibility. And for this reason they were given in the form of a letter—which makes it plain, too, what questions were asked—as follows:

The Coming of the $250 Light Car, Fully Equipped, a Certainty in the Light of Previous Development of Automobile Engineering

My Dear Mr. K.:

The following is what I have to say regarding the questions you asked me here in Hartford:

I think we are decidedly in a position to be able to revise our automobile engineering knowledge so as to produce a commercially successful **light motor car.** In looking forward from a standpoint of established fact to what seems to be a logical possibility, we must take past history as our chief guide. Let us briefly analyze automobile engineering history as it relates to this particular question:

We began by concerning ourselves exclusively with what was necessary in order to "keep the machine going," regardless of any other consideration. Breakdown, was the great nightmare before us. Cost to manufacture and market were subordinate questions.

Then came the middle period, when the most skillful of us saw clearly beyond dispute that we had the knowledge of how to produce a machine which would "keep going indefinitely." This conviction developed a new school of automobile engineering. It was evident that with this knowledge of how to produce a motor vehicle which could be absolutely depended upon inspired certain of us to see how **cheaply** we could produce this reliable motor car. The low price astonishingly successful vehicle appeared forthwith. This is where we stand today.

Now, there are certain of us who realize **two** big facts—that we have the knowledge necessary to build a thoroughly reliable machine, and that we also have the knowledge necessary to build this machine and sell it for $500. This has inspired certain of us to take the third step: To alter our original engineering practice enough to accommodate the new manufacturing possibilities, **and to produce a motor vehicle for $250.** There are a lot of us who are convinced that this can be done, just as there were some of us in 1903 who were convinced that a successful car could be made and sold for $500.

This idea is fixed in men's minds, and we know that once an idea is positively fixed there will be a man come along who will carry out the idea successfully. The light cheap car will come, and nothing can hold it back, in my judgment.

As regards **starters, gear shifters and transmissions,** I believe these will undergo astonishing simplification **after** the light car has come into its own. It is just as logical to believe that a cheap and thoroughly good starter will be produced when the demand for it has been established, as it is to believe that a cheap and thoroughly good motor car will be produced. Tremendous possibilities exist when the demand is big enough. I expect the starter will be operated by gas, as this is both light and cheap, and I expect the lighting will be electrical with something very cheap in the way of a primary battery for carrying the load when the engine is not running. But, this is only my own personal analysis, and really should not be given, since we are engaged in this discussion in considering broad questions only.

In the case of gear shifters and transmission devices, I fully believe that we have every right to assume that we shall duplicate in the cheap light car every improvement developed for the high priced car. If semi-automatic gear shifting becomes general, a way will be found to semi-automatically shift the gears on a light car by an extremely cheap-to-build and light-weight device.

Just so with transmissions. If an hydraulic or an electric transmission comes on large cars, a duplicate will be found for the light cheap car. The law applies on accessories in exactly the same manner that it applies to the complete motor vehicle.

In the matter of Dr. Steinmetz's expressed belief that the electric motor car will be the car of the future, I am unable to believe that Dr. Steinmetz intended this to apply immediately, or within the next ten years. We all expect that eventually we will find a way to develop power from some previously prepared and intensely concentrated fuel, and that this fuel will be applied electrically. But, we do not consider we have the right to expect this until several new **discoveries** have been made, and not merely new inventions. We are as far as we can go electrically, in motor vehicle matters, until some new discovery is made, in my judgment.

As for your question regarding whether the average citizen [motorist] will ever catch up to the technical understanding of the internal combustion motor, and its accessory apparatus, I do not believe it is necessary. He will never catch up to any specialty, whether it concerns an internal combustion engine or a surgical operation. The average citizen is a composite of many composites, and all he asks is that you give him something which will **get him there and back** with the expenditure of ordinary average intelligence. If you don't someone else will, and he knows it, and he will buy from the other fellow.

Very truly,

June 27, 1914. *Hiram Percy Maxim.*

The question of location is one so momentous to every new concern and to every firm contemplating a change that no one man's opinion on the subject can be considered as exhausting its interest. The fact that Chicago, for example, has never become a large center for automobile manufacture may not be fully explained by the superabundance of other financial interests in that city and its vicinity; yet they may have influenced the results. Everywhere the personal elements and those depending upon the currents of information and assistance, financial, mechanical and industrial, in which a manufacturing concern finds itself placed, are so intricately mingled that final conclusions are difficult to reach except in the case of strongly marked movements involving large districts. That bonuses and municipal concessions may play an important part in influencing a decision on location is usually conceded, but in the history of the industry these considerations have rarely proved themselves decisive for full-grown success in the long run.

Broad and reasoned viewpoints on the whole matter, illuminated by examples, could not fail, if they were forthcoming, to help in bringing clearness in a matter which is often decided somewhat at random, on purely personal or local grounds, and in many other cases is allowed to drift along for years unsatisfactorily. The views of Mr. Maxim seem very helpful to start thought along definite lines, while those relating to design and cost no doubt will rouse contradiction.

The Engineering Digest

Concurrent Control of Fuel and Air in Bréguet's Carbureter

LATELY a large number of Gnôme and Rhone motors in French aeroplanes have been fitted with Ramondou carbureters, which are a recent invention by Bréguet, the well-known aeroplane designer and builder. Practical tests had shown that they were more economical with fuel—in the case of motors with revolving cylinders—than the best carbureters before used and also that they produced a higher maximum power—both items of the greatest importance for aviators.

The characteristic of the Ramondou carbureter is that the gasoline and the air supply are regulated simultaneously to produce the same proportions in the gas mixture at all motor speeds.

The carbureter body A has at the narrowest place of the suction channel a lateral cylindrical appendage in which two concentric and hollow pistons I and J can be moved to regulate the cross-sectional area of the suction channel from zero to maximum, as in other cases done by the throttle. Piston I projects at one end, where it is provided with an eye for attachment to a control rod, from the cylindrical body and contains in its bore the valve needle B which at its opposite end projects into the jet and fuel feed tube F. Spring K establishes an elastic connection between pistons I and J. In the position shown in Fig. 1, in which both pistons completely close the suction channel, the needle B also shuts off the fuel by pressing the conical portion Z against the mouth of tube F.

The regulation of the two pistons in the opposite direction is limited in two ways. The piston I can be pulled into the cylinder until the flange S abuts against the end of the adjustable threaded sleeve T, while piston J can follow this movement only till it is stopped by the ends of screws M which sit in the ring D, provided with the lever H, and themselves can be adjusted. The manner of adjusting the threaded sleeve T by means of the screwhead E and the locknut V is plain from the drawing. The ring D is moved slightly up or down, when lever H, to which the air-control rod is attached, is turned, as the screws M follow oblique slots in the cylinder wall. The spring K comes into action when piston J is stopped by screws M while piston I and needle B are pulled farther out. Spring L serves only the purpose of steadying the needle valve.

Rapidly Regulated

The regulating of the carbureter is done as follows: After the motor has been started, the suction channel is first throttled to a small opening—2 to 3 millimeters—and then the fuel feed for still-running is adjusted once for all time by screwing the jet tube F in or out, after loosening the locknut U, so as to regulate the interval between the mouth of the tube and the needle at the conical portion Z. This adjustment once found and the locknut re-secured, the regulation for full power is made. To this end the piston I and the needle are pulled out till the maximum power is obtained, locknut V is loosened and sleeve T is screwed into abutment with flange S. The proper amount and velocity of air at this adjustment is obtained by means of lever H which, as mentioned, limits the opening of piston J.

After these permanent adjustments the carbureter will thus produce the correct fuel proportions as well at still-running and very slow speed as at the highest velocities, and it is the designer's theory, which has been found supported by the practical tests, that the proportions must also be right at all intermediate speeds by reason of the simultaneous opening or closing of the jet and the suction channel by which the throttling operation for any desired power effect is made.

Furthermore, the lever H, though normally left untouched, may be separately operated if a change in atmospheric conditions—altitude, humidity—should make this desirable.

Security against carbureter fire is to some extent obtained through the fact that the fuel is shut off when the suction channel is closed, and any striking out of a flame is prevented by the double metal-gauze screens O in the air-intake drum and the S-shaped course a flame must follow to reach them, causing it to spend what force it may have against the slightly springy aluminum bell G.

In applying this carbureter to an aviation motor with revolving cylinders, it is connected by a right-and-left thread union nut directly with the end of the hollow crankshaft, as is the general practice for Gnôme motors. It can also be applied with an intermediate elbow, so as to bring the plane of the air-intake parallel to the direction of movement. The principle of this carbureter should be applicable to automobiles.—From *Der Motorwagen*, June 10.

Saving a Little Weight and Wear in Sliding-Gears; Vibration Too

IN all gear boxes the wheels, when in mesh, are directly opposite each other, as in the left portion of Fig. 2, and the chamfered portions of the teeth, while necessary for easy shifting of the gears and to avoid burring them, represent a certain waste in the useful width of the metal, as they constitute narrow zones on both sides of the wheels, and these zones are out of engagement and yet so close to being engaged as to give rise to noise and vibration. It is now proposed

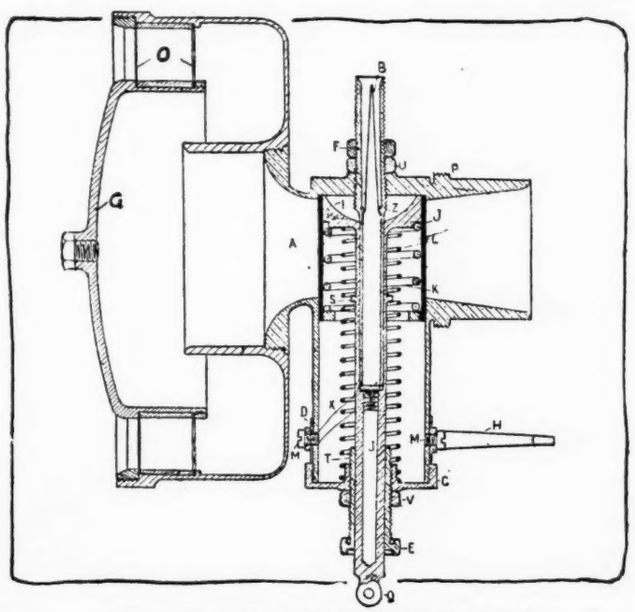


Fig. 1—Ramondou carbureter, aeroplane style

to remedy this and gaining the width of one of the zones for the metal in engagement by arranging to push the slidable gear so far through that the chamfered zones of both gear wheels are released, as shown to the right in Fig. 2, while the entire width of the straight portions is engaged.

In practice the tapered portions of the teeth correspond to a width of about 3 millimeters in the ordinary four-speed gearbox with three sliding members. In this case, if the improvement is applied to the three reduced gears, the application to the third speed does not lengthen the gearbox at all, while the application to the second speed lengthens the box by 3 millimeters; and, further, if the wheels for the second and third speeds on the intermediate shaft are in one piece, the slidable wheel enters the space left for the disengagement of the sliding-fork.—From *La Technique Automobile*, June 15.

Sightly Device for Securing Nuts and Bolts—Tests Favorable

SPRING washers and split pins are the most favored means for securing the nuts on the ends of bolts in automobile construction in cases where they afford sufficient security, while locknuts of the depth required for real efficiency are deprecated for looking clumsy and adding to the necessary length of the bolts. New devices intended to supply the long-felt want of a thoroughly acceptable contrivance are therefore constantly forthcoming, while automobile and accessory designers, on the other hand, strive to reduce the number of bolts used in a construction to a minimum, even resorting to riveting in many instances, on the plan that the riveted end of a bolt can be chiseled off, in case of necessity for taking the construction part, and the bolt replaced. Retaining-flanges and autogenous welding are also employed more and more where formerly bolts and nuts abounded.

The latest locking device, heralded from France, is shown in Fig. 3 and has been tested at the laboratory of the Conservatory of Arts and Trades. It was here shown that a locknut turned on with a pressure of 5 kilograms at the end of a wrench .40 meter long came completely loose after 80 shocks, while the *autobloc*, as the new device is called, though secured by hand only, remained in its place after 103,000 blows. It was also found that the work required for turning an *autobloc* nut without its locking piece amounted to 3.2 gram-meters, while with this piece in place the work required rose to 2,720 gram-meters. Prolonged use of the device on the locomotives of the Metropolitan in Paris has confirmed these results.

A peculiarly shaped slot in the nut and the locking-pin constitute the whole provision, the bolt remaining whole and no longer than needed for taking the nut. The slot has a rocking-edge on its outer side and a curve on its inner side. The pin has rectangular faces and is thinner at one end than at the other; the face turned toward the bolt is grooved lengthwise to correspond with the thread of the bolt. It seems that the grooves are straight. When the pin is driven into its place, it is squeezed between the sharp ridge on the outer wall of the slot in the nut and the much larger contact surface with the threads of the bolt. When a tendency to loosening of the nut manifests itself, the pin therefore turns with the bolt and is wedged the harder in the slot the stronger the tendency to loosening becomes.—From *Omnia*, June 27.

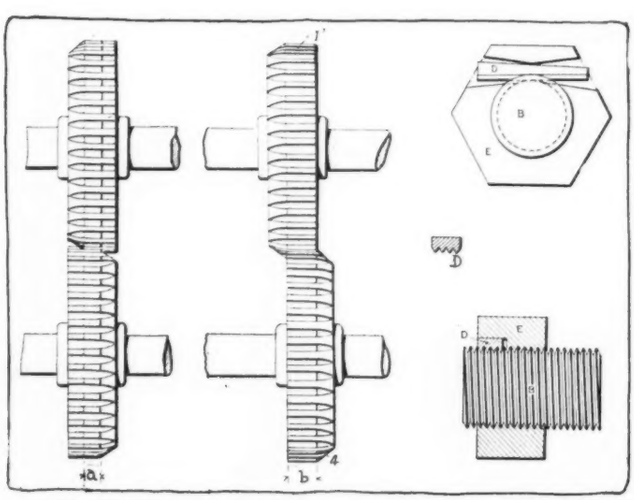


Fig. 2—Improved gear mesh.

Fig. 3—Nut lock

Double Eccentric Worm Adjustment —An Important Improvement

IT is known that the correct mounting of a worm drive is so complicated and difficult that this feature more than any other has retarded the adoption of this driving system, says Mr. Decoux and quotes in confirmation of this assertion Mr. Perrot, chief engineer of the Argyll works where a good thousand of worm-drive vehicles have been turned out. Mr. Perrot's remark is: "The worm must be mounted absolutely in the middle plane of the worm wheel; the smallest deviation causes considerable friction, and the drive heats up." The simplest method for overcoming all difficulties involved in this peculiarity consists in employing a double eccentric adjustment on the principle indicated in Fig. 4, according to Mr. Decoux. It is patented, he says.

The worm shaft A is mounted with its bearings in two eccentric sleeves B and C. One of them can be the torque tube and the other can be operated from the rear. By turning one of the eccentrics the worm shaft is displaced to the right or left, to center it in relation to the wormwheel. If it is desired to adjust the shaft vertically, it is sufficient to turn both eccentrics an equal amount in opposite directions. The regulation is thus obtained without need of adjusting the wormwheel, so that its alignment with the other organs of the construction, such as the gearbox, is conserved.

By this method the axis of the worm shaft can be taken to any position within a circle which has for its radius the sum of the two eccentricities. The plan facilitates machining and mounting and readily admits of changes in the transmission-ratio. It can also be applied to the steering gear and for the centering of brake shoes. In the case of the worm drive, a system for locking the adjustments has also been devised.—From *La Technique Automobile*, June 15.

The Oiling of High-Speed Motors

AT the recent Tourist Trophy run on the Isle of Man the majority of the involuntary stops were caused by deficient cylinder oiling, doubtless due to exaggerated linear piston speeds, according to a French observer's report. Fractures of mechanical components were practically unknown and the tires gave little trouble. With regard to the oiling it is noted, however, that all the motors used in the race, excepting that in the Straker Squire car, were specially designed creations, this including the Knight motors in Minerva cars, which were provided with an auxiliary exhaust.

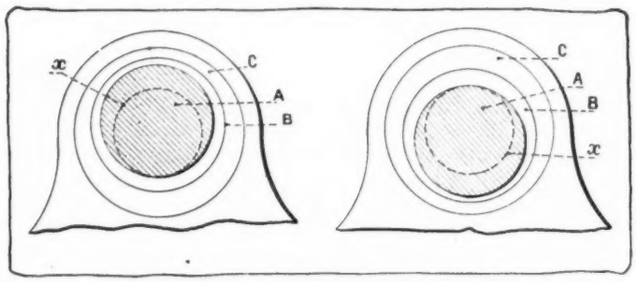
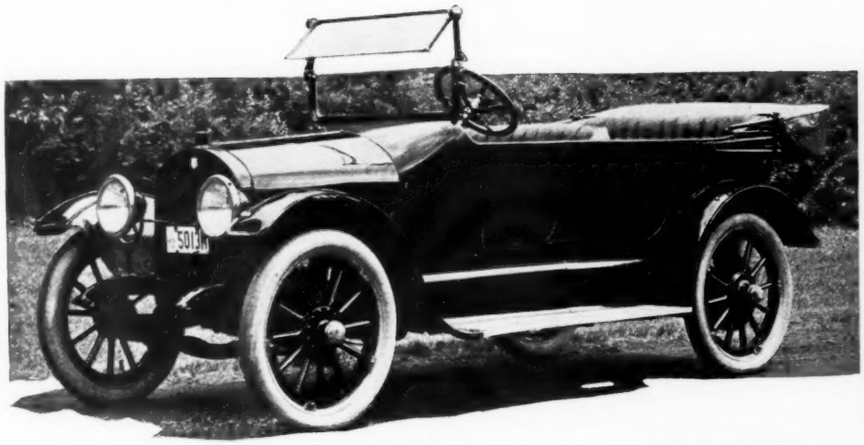
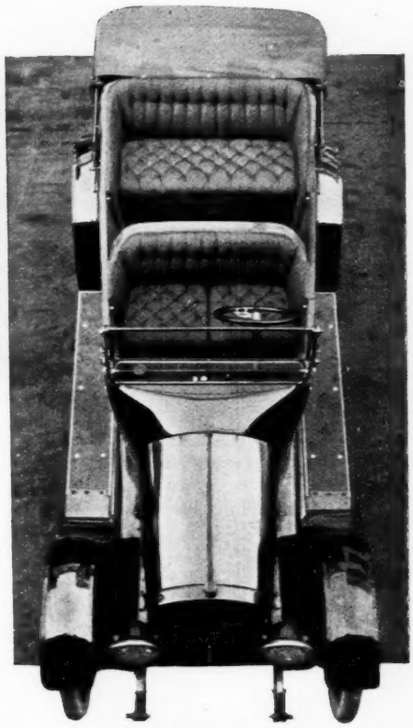


Fig. 4—Adjustment for worm drive shaft

Stream Lines Distinguish 1915 King



King for 1915 with larger motor, streamline body and crowned fenders for $1,165



Plan view of 1915 King showing seating arrangement

Bore of Cylinders Increased 1-16 Inch —Wheel-Base Lengthened One Inch— Brakes Improved — Inside Upholstery

RADICAL changes mark the introduction of the King car for 1915. A larger motor, streamline body, crowned fenders and a reduced price are the three most prominent innovations. With the new body and the many refinements the new King bears but little resemblance to its namesake of a year ago.

1/16 Inch Added to Bore

The most important change mechanically is the addition of 1-16 inch to the bore of the cylinders, making them 3 15-16, the stroke remaining at 5 inches. This adds materially to the power output, although the manufacturer's rating has been left at from 30 to 35 horsepower. The S. A. E. rating is 24.8 horsepower.

The latest idea from Europe is that the upholstery is placed entirely inside the body, none protruding over the edges. This is a harmonious touch which is distinctive.

Cantilever Spring Mounting New

Although retaining the cantilever rear springs which have always been a characteristic feature, a modification has been made in the manner of attaching their rear ends to the axle housing. The former plate-and-sleeve construction on the axle housing has given way to a hinge form of attachment. An eye bolt through the lower leaf of the spring secures the latter to a sleeve around the housing.

In connection with this spring mounting change, the forward end of the torque tube is attached to the lower side of the gear box by a slip joint which allows free end play to the torque tube while preventing injury to the end thrust bearing in the universal joint due to side thrusts occasioned by changes of positions of the outer ends of the rear axle in conforming to the irregularities of the road.

New Axle Housing 50 Pounds Lighter

The wheelbase has been lengthened 1 inch to 113 inches. A pressed steel axle housing now is provided to replace the east type formerly employed. This new housing is 50 pounds lighter. The axle itself is of new form in that a floating construction supersedes a three-quarter floating one. Option of either a 3.7 to 1 or a 4 to 1 ratio is given. The latter for hilly country.

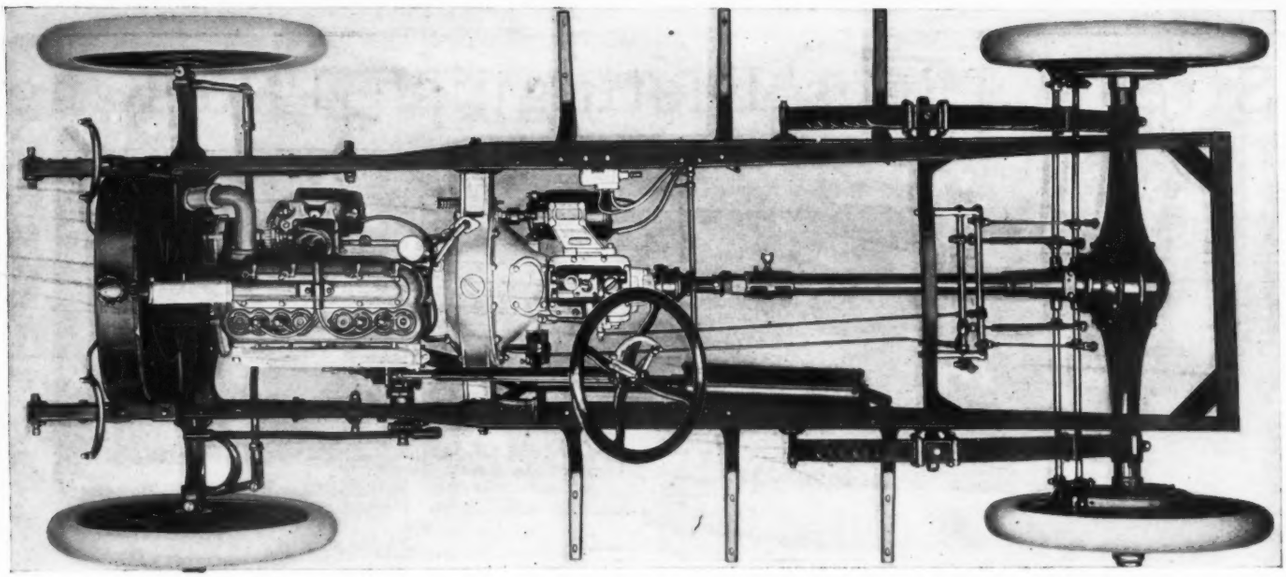
The brakes, too, have come in for some change to make them simpler and more efficient. The internal bands are of the full wrapping type for operating practically the entire circumference of the drum, as compared with the semi-wrapping or crescent-shaped band used in the preceding model. Operation of these internal bands is now by an S cam instead of by toggle joints.

The general construction of the engine has not been changed because of the bore increase. It is an L-head type with both manifolds on the left and is three-point suspended from the main frame, the clutch and gearset being in unit with the crankcase. The aluminum crankcase is horizontally split into halves.

Both intake and exhaust manifolds are separate from the cylinder block, and bolt to it. There is an individual opening into the exhaust header from each exhaust port, while in the case of the intake one opening into the block takes care of the distribution internally to two intake ports. One manifolding change is the shortening of the intake and causing the carbureter to be mounted higher. This is made possible by the location of the fuel tank in the cowl and makes the Stromberg carbureter more accessible, besides tending to greater mixing efficiency since there is less pipe length for condensation.

Spiral timing gears are used. There is only one exposed shaft, that being on the right and driving through belt connection the fan, the ignition distributer and the generator, when the latter is supplied.

A honeycomb radiator replaces the formerly used vertical tube pipe. It is more efficient and its appearance attractive, the front edges being coped after present-day fashions. The system is thermo-syphon. The inlet connection to the block is at the front right side, the distribution to the jackets being an integral part of the casting.



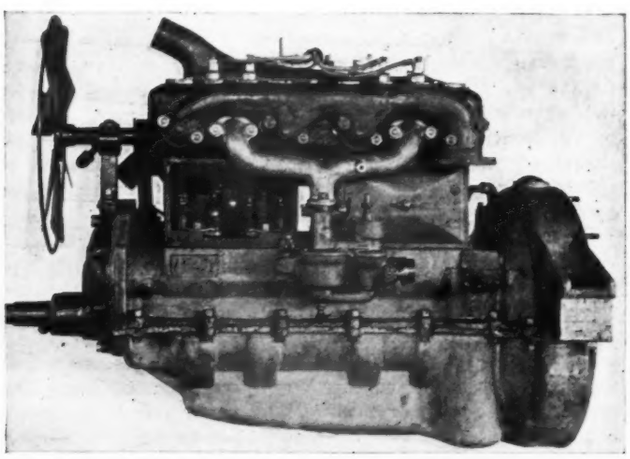
Plan view of King chassis, showing new slip joint attachment at forward end of driveshaft housing

The lubrication system is a combination of force feed and splash, the flywheel acting as a pump and delivering the oil to the crankshaft bearings and the timing gears. Rotating in the oil, it throws oil into a scoop or trough by centrifugal force. Thence it goes to the bearings. The cylinder walls and pistons receive the splash from the connecting-rod ends dipping into the splash troughs, there being individual troughs.

Flywheel Acts as an Oil Pump

The ignition has been entirely changed, the magneto being replaced by the Atwater-Kent system. The distributer is mounted where the magneto was formerly placed, being driven off the end of the fan and generator shaft. The chief advantage claimed for this change is that there is a gain in flexibility at low speeds due to the fact that the current supplied by the battery is constant regardless of the speed of the motor.

The Ward-Leonard cranking motor and generator are separate units, with the generator mounted below the ignition unit on the right of the engine, and driven by silent chain from the shaft. This chain is not enclosed and allows the ready removal of the generator. Generation of current reaches its maximum at from 10 to 15 miles an hour car speed, the generator being driven at twice engine speed. A special controller keeps the Willard 80-ampere-hour battery charged fully and prevents too rapid charging, at the same time allowing full rate at the car speed mentioned.



Left side of King motor showing a high mounting of carbureter

The cranking motor unit is located at the right side of the gearbox, to which it is bracketed and is a more powerful one than its predecessor, being capable of turning the engine at from 135 to 140 r.p.m., as compared with 90 r.p.m. The reduction gearing between it and the flywheel has also been simplified, one of the intermediate gears having been eliminated.

Starter Control Has Been Improved

The starter control has been improved and in place of the old pull-up handle there is now a lever between the front seats at the driver's right which is operated by pushing forward. The starting system is a two-wire type of 6 volts. There are large and small bulbs in the head lamp for city and country driving.

There are nine bronze disks and an equal number of saw steel disks used in the clutch whereas in the preceding model all disks were of steel. The disks are provided with cork inserts instead of being faced with an anti-friction material, as heretofore. The new clutch is very easy in action. The three-speed gear set uses chrome nickel gears, as compared with the combination of carbon and nickel in the older models. Ball bearings have given way to Hyatt throughout the gearset. A ball-and-socket lever controls the shifting instead of the cross type used before.

In line with the other body trimness, the fenders are crowned and conform closely to the contour of the wheels. The instrument board containing gasoline gauge, electric light switches, ignition switch, speedometer and speedometer light is another new feature which brings the new King up to 1915.

Gasoline Tank in the Cowl

The gasoline tank is located in the cowl and contains 12 gallons, the filler being at the right side so as not to interfere with either occupant of the front seat. A gasoline gauge is also provided. The previous model had the gasoline tank under the front seat.

A notable manner of clearing the running boards of any obstructions is found in this new model. The storage battery is placed under the front seat at the driver's right, the tool box being located under the drive seat. These are therefore both very accessible, while the space under the rear seat is left for luggage. The extra demountable rim and tire are carried at the rear. Tires are 33 by 4 front and rear.

Steering is on the left, the gear being of Gemmer make and operating through an 18-inch wheel. Cast aluminum spark and throttle levers on the wheel are a new thing in motor car construction, they being usually made of steel and nickeled. These aluminum controls naturally cannot tarnish and are amply strong. The horn button is conveniently located in the center of the steering column above the wheel.

The equipment takes in everything now demanded by the driver. There is a rain division windshield, silk mohair one-man top, quick detachable side curtains, Stewart speedometer, electric horn, demountable rims with one extra and a complete outfit of tire tools, machine tools and jack.

The 1915 series, known as model C, comes in roadster and touring car, and the application of the Ward-Leonard cranking and lighting system is optional as it was last year. With this equipment the new price with either body is $1,165 as compared with $1,195 last year when similarly equipped. The price without these electric features is now $1,075, or $20 less than previously.

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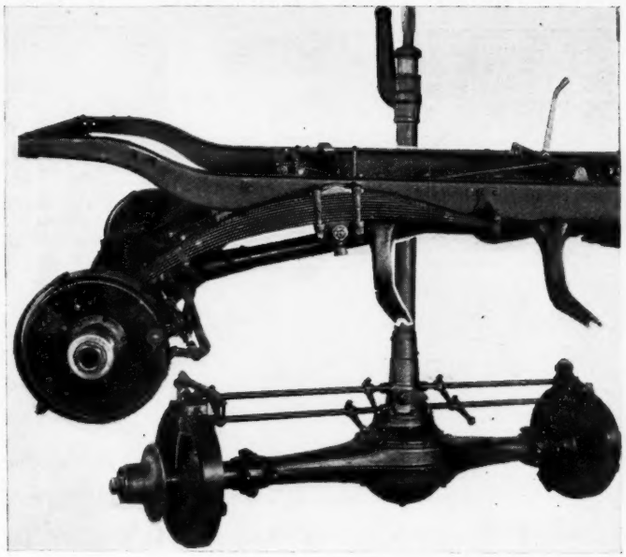
Metz for 1915 Has New Fore-door Body

IN producing its 1915 model, the Metz Co., Waltham, Mass., has paid a great deal of attention to the details of body design, with a view to perfecting the car's appearance but no mechanical changes have been made, as none were found necessary. The price remains at $495.

The new car is characterized by a streamline body, with tapering hood, sloping cowl, high doors, and a slanting rear deck. The new windshield is a two-piece, design that is fully adjustable. Another departure is the removal of the lamps from the fenders they now being attached at either side of the hood. They are reinforced by a connecting bar. A Prest-O-Lite tank has been substituted for an acetylene generator. The body changes have necessitated increasing the wheelbase from 90 to 96 inches and this also improves the looks of the machine. The gasoline tank, holding 10 gallons of fuel, is concealed in the cowl and feeds by gravity.

Mechanically the 1915 Metz, is exactly the same as the 1914 model, the leading characteristic of which is the friction speed changing mechanism from which drive is taken through a jackshaft and side chains to the rear wheels.

The four-cylinder motor has block-cast, L-head cylinders 3.75 by 4 inches, the S. A. E. rating being 22.5 horsepower. The valve stems and springs are inclosed and both crankshaft and camshaft, which are steel forgings, are finished by grinding and run in white metal bearings. Lubrication is by a constant level splash system with pump circulation of the oil; and cooling is by thermo-syphon, the capacity of the system being 3.5 gallons. The carbureter, which is made by the Metz company provides the proper mixture at all speeds and ignition is effected by a Bosch high-tension magneto.

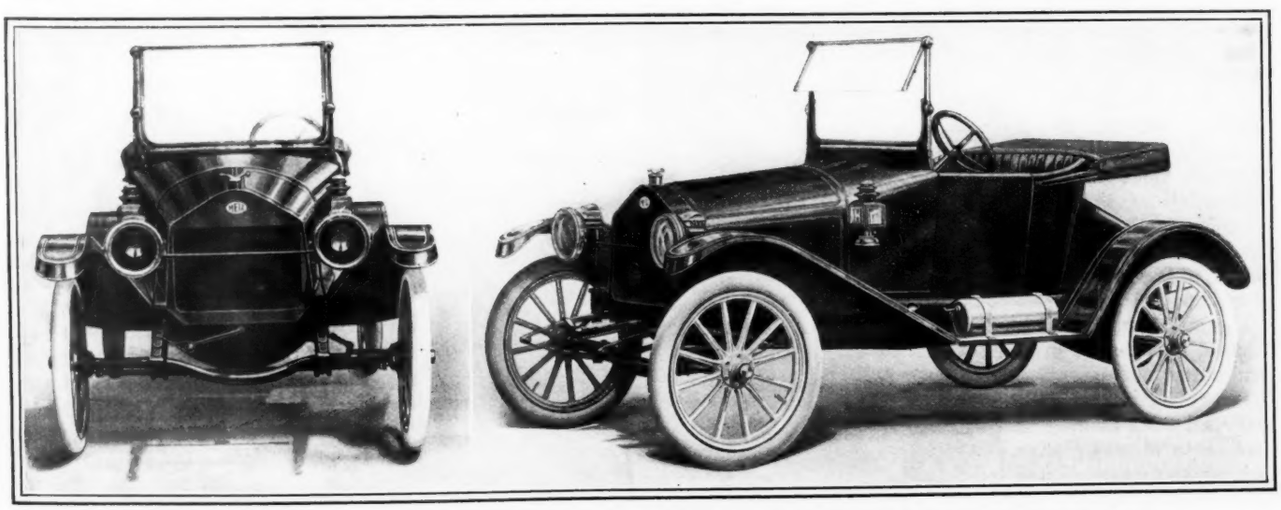


Upper—King rear construction, showing cantilever spring. Lower—Plan view of rear axle and driveshaft, showing new mounting of springs at rear

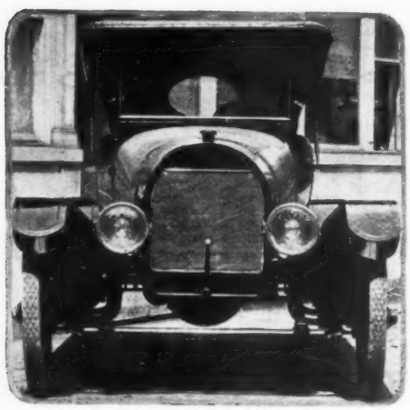
Friction Drive Employed

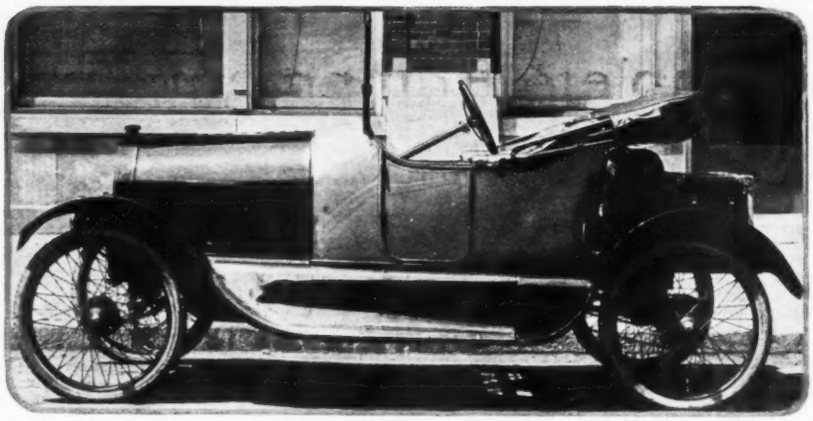
The friction drive is effected through a disk and wheel, the wheel being shifted along the face of the disk to gain the different speeds. From the wheel the power is transmitted to the drive shaft by a single silent chain; and from the jackshaft which carries an inclosed differential, the drive is transmitted to the rear wheels by side chains which are inclosed in tight cases and operate in oil. The gear ratio is 3 to 1 on high.

The frame is of pressed steel and is supported by full elliptic springs all around. The wheels are wood, 30 inches in diameter and are shod with 3-inch tires. The braking equipment of the machine is unusually complete there being a set of internal expanding brakes on the rear wheels, an external contracting brake on the jackshaft, and besides, the friction disks may be used for braking purposes. All wheels run on ball bearings and the tread is 56 inches.



Left—Front view of 1915 Metz, showing streamline hood. Right—Side view of Metz showing new body lines





Dodge light car from the front—Side view of the little Dodge runabout body with streamline effect

Dodge Car Newest in Light Field

Dodge Motor Car Co. Offers Electric Starting on $595 Car Weighing 1,400 Pounds

THE Dodge light car has just been brought out by the Dodge Motor Car Co. of Detroit, which must be distinguished from Dodge Bros. of the same city. The Dodge car which is referred to here is made by the company which has been named after its president, Alvan M. Dodge who was formerly associated with the Wahl Motor Car Co.

The new car is a two-passenger type of standard tread having a sloping hood and rounded top, giving a more or less foreign appearance. The complete weight of the car with tanks filled is 1,400 pounds.

In offering this new light car, the Dodge company makes two optional prices. When equipped with top, windshield, two gas headlights, oil tail lamp, gas generator, 30 by 3 tires and bulb horn, the car may be had for $495. But with electric cranking, top, windshield, two double-bulb electric headlights, electric tail lamp and horn, electric generator and storage battery, 30 by 3 1-2 inch tires, the price is $100 more.

The car has a four-cylinder, water-cooled, valve-in-the-head engine with a bore of 3 11-16 inches and a stroke of 4 inches. This is said to develop 25 horsepower, which is ample to pull the light chassis through any kind of road. Speeds from 3 to 45 or 50 miles an hour are attainable, while it is further stated that economy of fuel is another notable feature, 30 miles to the gallon of gasoline being the rule.

The engine uses rocker arms to operate the overhead valves.

The cylinder head itself is detachable, making it possible to remove pistons and connecting-rods through the top. The spark plugs are set into the head casting at an accessible angle, while the exhaust manifold is integral with this head, the outlet being through a single opening, thus eliminating back pressure.

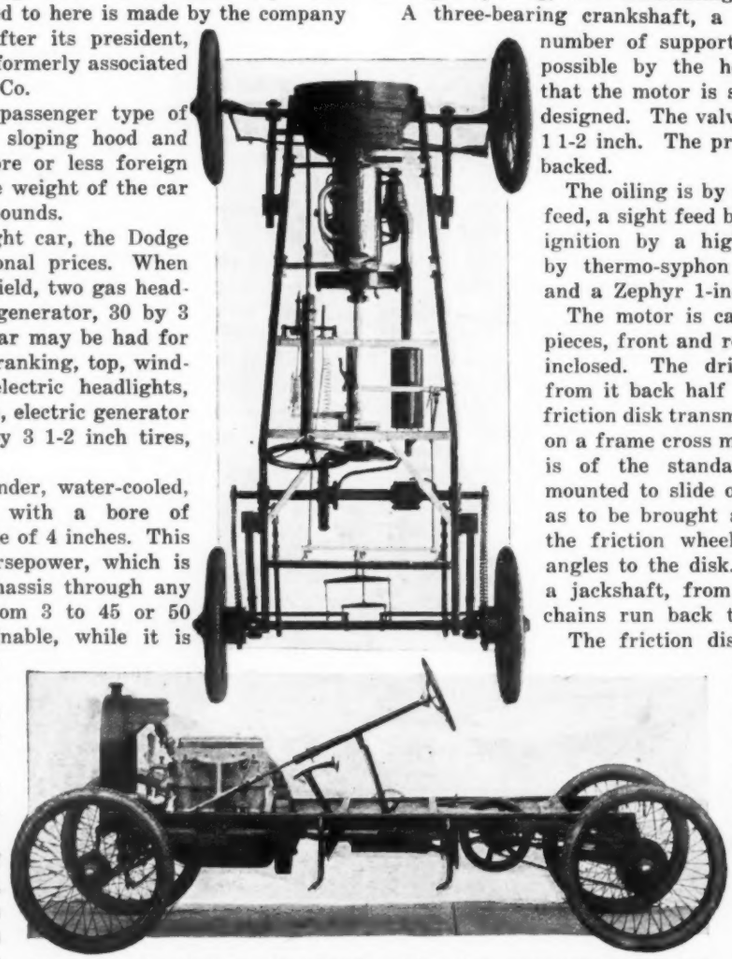
A three-bearing crankshaft, a camshaft with an equal number of supports and large valves made possible by the head construction indicate that the motor is substantially and properly designed. The valves have a clear opening of 1 1-2 inch. The principal bearings are brass backed.

The oiling is by splash with positive pump feed, a sight feed being mounted on the dash; ignition by a high-tension system; cooling by thermo-syphon with a belt-driven fan; and a Zephyr 1-inch carbureter is used.

The motor is carried on two bowed cross pieces, front and rear, and its flywheel is not inclosed. The driving shaft runs directly from it back half way of the chassis to the friction disk transmission mechanism mounted on a frame cross member. This friction drive is of the standard type, the disk being mounted to slide on the end of the shaft so as to be brought against and released from the friction wheel which revolves at right angles to the disk. This wheel is carried on a jackshaft, from the outer ends of which chains run back to the rear axle.

The friction disk control lever is at the right of the driver, the steering wheel being on the left side. The side drive chains, running in oil, are inclosed and the rear axle to which they connect is a 2-inch tubular type. There are two sets of internal expanding brakes on rear axle drums.

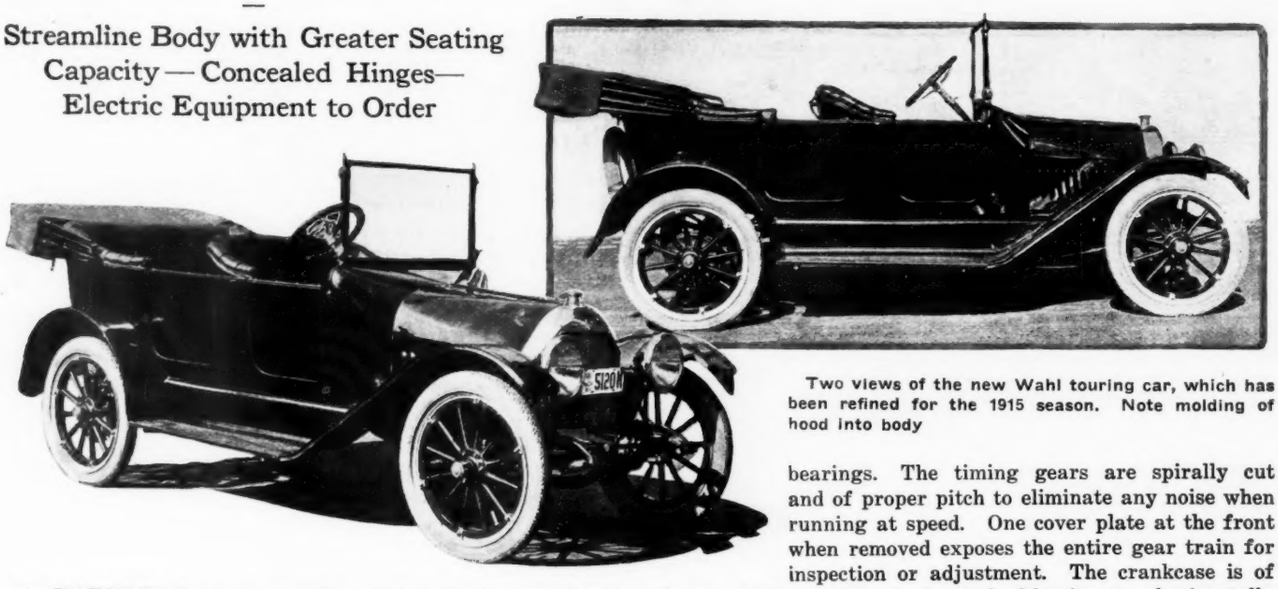
Cantilever springs are used front and rear. Wire wheels are standard.



Plan and side views of the chassis which has been constructed for lightness and strength—Note friction drive

Complete Equipment Features 1915 Wahl

Streamline Body with Greater Seating Capacity — Concealed Hinges— Electric Equipment to Order



Two views of the new Wahl touring car, which has been refined for the 1915 season. Note molding of hood into body

FEATURED by more complete equipment, the new Wahl car, the product of the Wahl Motor Co. of Detroit, is now ready for delivery. The new features of the car are chiefly minor refinements and include a more up-to-date top, full streamline body with flush doors, concealed side door hinges, wider seats, deeper upholstery, roomier tonneau, double-bulb headlights, electric horn and, to order, an electric starter.

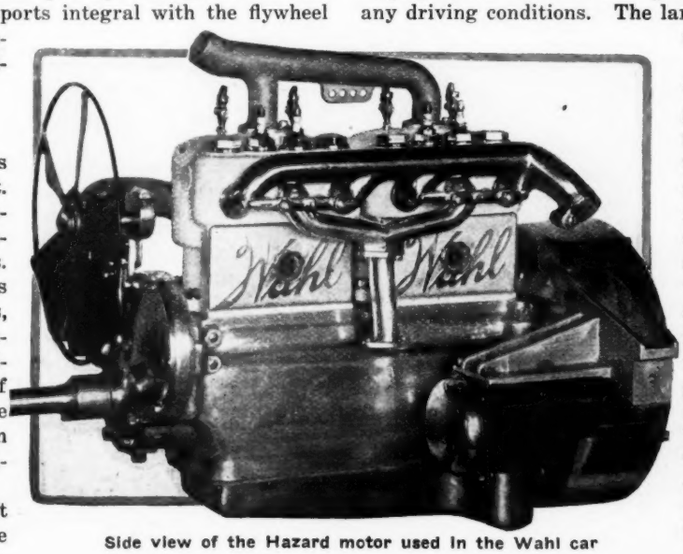
On the 112-inch wheelbase chassis there are two bodies fitted as standard, a roadster and touring car. Both sell at the same price, $890, with equipment, excluding starter and lighting system which is $125 extra. The car weighs 2,250 lbs. and is featured by a unit power plant, disk clutch, three-speed gearset with right drive and center control.

The horsepower rating of the Hazard motor is 28.5, according to the maker, and with a 3.75 by 4.5 cylinder this motor should readily turn up that amount although the S.A.E. rating is but 22.5. The construction is of unit type, the gearbox bolting through a flange to the rear of the flywheel housing, and the three-point suspension principle being carried out by having the two rear supports integral with the flywheel housing and the front support in the center. The cylinders are cast in pairs.

Valves on the Left

Being an L-head the valves are all on one side—the left. These are completely inclosed by two cover plates removable through thumb nuts. The exhaust header runs above the intake connections, and there is an individual exhaust opening from each cylinder, allowing free escape of the burned gases, while there is a common opening from each two cylinders to the intake manifold.

Crankshaft and camshaft are each carried on three bearings. The timing gears are spirally cut and of proper pitch to eliminate any noise when running at speed. One cover plate at the front when removed exposes the entire gear train for inspection or adjustment. The crankcase is of the barrel type. That is, instead of having two horizontally split halves, it is all in one piece. There is an opening at the bottom, which gives access to all bearings, however.



Side view of the Hazard motor used in the Wahl car

The oil pan which is bolted to the under side of the crankcase contains a series of four troughs which are used in connection with the splash system of lubrication. A scoop on the lower end of each connecting-rod dips into the corresponding trough on each down stroke, splashing the lubricant up into the cylinders and lubricating the walls and piston surfaces. The timing gear drive is oiled from an oil pocket of a depth sufficient to insure a sufficient quantity of oil at all times.

The carbureter is a Stromberg, while ignition is provided for by an Atwater-Kent distributer system, the unit being placed on the right side and driven by a shaft in connection with the timing gears.

Thermo-Syphon Cooling

A very efficient method of cooling by thermo-syphon is employed, which is said to be proof against over heating under any driving conditions. The large V-radiator is of Mercedes type. The fan is belt-driven.

The two-unit electrical system is a Deaco, motor and generator being separate and mounted on opposite sides of the power plant. The generator, on the right, is driven from the exposed shaft at crankshaft speed, while the starting motor is placed at the opposite rear side and connects to the teeth in the flywheel rim through an overrunning clutch. The Michigan battery used with these instruments is of 90 ampere-hours capacity and 6 volts. The system is two-wire and there are two sets of bulbs in the headlights, the smaller being for city work.

The Automobile

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The Monocar

NOW that the postal department is extending the length of rural delivery routes from 24 to 50 miles and increasing the appropriation from $1200 to $1800 in order to permit of the use of a motor vehicle, there should be good opportunity for a small vehicle specially designed for this use. Such a vehicle could be a monocar, seating but one, and should be designed to meet all weathers.

The monocar has attracted attention abroad but has never been considered seriously in this country, in spite of the fact that some large industrial houses that provide their sales solicitors with motor vehicles are in favor of a one-seated machine as compared with a two-seated one. There are many city salesmen, in different lines, that have not any more use for a two-seated vehicle than they have for a limousine. The single-seated car is particularly suited for the work, and for city salesmen it can be made of narrower tread, which will assist in getting through traffic faster than the standard-tread machine.

The monocar for the rural free delivery man should have a narrow streamline body, so that resistance can be cut to a minimum, and weight can be held at the low-water mark. A compartment for the mail can be arranged in rear of the seat and a light, but adequate, top fitted from this compartment to the low windshield.

Getting Together

INDICATIONS point to a motor truck convention during the coming fall, in which motor truck makers and dealers will be brought together to discuss the problems that enter into the manufacture and merchandising of trucks. For the last 18 months this industry has been without any get-together conferences, and in not a few places it has suffered because of this.

Getting together, if for no other reason than becoming better acquainted with one another, is in itself sufficient reason why the makers and dealers should meet in annual conference. When a maker is left to himself for several months or perhaps a year or so, it is almost certain he will develop some action or mode of merchandising that is not in harmony with the best interests of the industry. Participation in open discussion prevents this.

There are, however, hosts of subjects that truck makers can discuss to their advantage. Some makers are opposed to conventions, because they think that nobody can tell them anything of value and that the entire convention will resolve itself into a question of a few giving away their manufacturing and merchandising secrets to the weaker ones.

Fortunately, there are few in this class. The rank and file acknowledge that there is much to be gained from a convention, and that while there may not be any revolutionizing factors unearthed, yet meeting and discussing questions in common will wipe away many of the cobwebs that have hung so long in the musty places that the owners have begun to look upon them as real enduring factors.

Merchandising problems in the truck industry will stand discussion. Not that several of the leaders in the industry are not using the most approved methods but that some of the weaker ones are not merchandising to their own advantage or to the good advertisement of the industry.

Others have been working on the installment payment policy along impossible lines.

With others the "knocking" evil has been carried so far as to react on themselves as well as injure the industry.

Others are a little dubious on the future of the industry and a true analysis of the possibilities of motor trucks would stand them in good stead.

There are those who want to know what service from the manufacture to the dealer means, and others who want to know what service from the dealer to the owner should comprise.

The possibilities of using kerosene in motor trucks and the feasibility of kerosene carbureters are today mooted questions whose clear discussion must benefit the industry.

With some the question of final drive is uppermost—whether it is to be enclosed chains, double-reduction bevels, single-reduction bevels or the worm mounted either above or below the axle.

It is not expected that a convention would give the last word on any of these subjects, but a thorough analysis would be of material interest to many in the industry.

1 Car to Every 35 Inhabitants in Bay State

Registrations of 64,717 Cars in 6 Months Exceed by More Than 2,000 the Total Licensing of 1913

BOSTON, July 11—An argument against pessimism in the motor industry is shown by the fact that in 6-months of 1914 more than 2,000 motor cars have been registered in Massachusetts, more than during the entire 12 months of 1913, and the latter was a very good year, too.

In the 6 months the Bay State has collected $16,201.18 more from automobile owners than it has in the entire 12 months of the preceding year. If the rate of increase keeps up more than 75,000 motor cars and trucks will be listed this year. And the revenue will total more than $1,000,000.

At the present rate approximately 100,000 will be operators of machines, or one in every 35 inhabitants.

Comparisons between the first 6 months of 1913 and a similar period of 1914, and also between the entire 1913 period and the first 6 months of 1914 show some interesting figures. There is not an increase in the operators and chauffeurs because each gets a license that runs for 12 months, renewable at any time. But there is an increase for the first 6 months this year over the first 6 last year in all departments except chauffeurs, the decrease there denoting that more people are driving their own cars. The figures are given in the accompanying table.

Delaware Adds 164 More Cars for June

DOVER, DEL., July 13—One hundred and sixty-four new registrations were added to the list of owners of automobiles in Delaware during June. Of this number there are fifty-eight Fords, eleven Maxwells, fifteen Overlands, seven Buicks, nine Studebakers and eight Metz cars. The rest comprise a few foreign cars and a few high-priced cars.

Colorado Exceeds 1913 by 2,000 Cars

DENVER, COLO., July 9—The total registration of motor cars thus far for 1914 is 15,340. This is a gain of more than 2,000 above the total registration for 1913, which Secretary of State Pearce estimated at 13,000.

The city and county of Denver has a registration of 6,844 for 1914 and the outside counties 8,496, as against 4,793 for Denver last year and approximately 8,000 for the outside counties. 1913 was the first year of state licensing of motor vehicles in Colorado.

The 1914 registration is divided as follows:

Total number of gasoline passenger cars	14,267
Total number of electric vehicles	708
Total number of gasoline motor trucks	272
Total number of electric motor trucks	27
Total number of steam cars	66
Total number of all classes	15,340
Number of gasoline passenger cars up to 25 horsepower	8,695
Number of gasoline passenger cars above 25 horsepower	5,572

90-Day Warranty Pasted to Car

NEW YORK CITY, July 7—The plan of pasting a copy of the N. A. C. C. standard warranty on the board which holds one of the front seat cushions, so that the warranty becomes a part of the car, has been adopted by one of the members of the National Automobile Chamber of Commerce to insure that the purchaser will receive a copy of the warranty and have plenty of opportunity to become familiar with its terms.

It has been the experience of the company that dealers do not always notify the factory of the name and addresses of new owners, so that sometimes it is impossible to place a copy of the guarantee in their hands.

Triplicate copies of the warranty are issued for each car, each bearing the serial number of the warranty and number of the car and lettered respectively A, B and C. One copy is pasted in the car, one goes to the dealer and one is retained by the manufacturer. All bear the printed facsimile signatures of the president and the secretary-treasurer of the company.

This method keeps the owner advised of his right to demand the replacement of defective parts, etc.

Jeffery Co. Fixes 23 Sales Districts

KENOSHA, WIS., July 13—A new plan of organization was announced by Sales Manager E. S. Jordan at a conference of Jeffery salesmen held at Kenosha last week.

The country has been divided into twenty-three districts, each in charge of a district representative working under the general direction of the factory sales department.

It will be the duty of the Jeffery district representative to appoint dealers, determine the extent of territories and exercise general supervision over the business of the Jeffery Co. in the districts assigned.

The appointments made with the territories designated and the headquarters of the various men are as follows:

Agent	Territory	Headquarters
C. G. Anderson	Northern Illinois	Peoria, Ill.
G. N. Bliss	Kansas and Nebraska	Kansas City, Mo.
John Carlberg	Oklahoma and Arkansas	Oklahoma City, Okla.
J. E. Corby	Indiana	Indianapolis, Ind.
A. E. Creeger	Western Ohio	Tiffin, Ohio.
C. S. Culp	New York	Rochester, N. Y.
W. H. Dailey	Southern Illinois	Kenosha, Wis.
L. H. Glenn	Western Iowa	Omaha, Neb.
H. C. Hart	Eastern Iowa	Des Moines, Iowa.
T. W. Johnston	North and South Carolina	Columbia, S. C.
E. W. Milburn	California and Nevada	San Francisco, Cal.
R. R. Minton	Colorado, Utah and Wyoming	Denver, Colo.
G. B. Muma	Montana and Canada	Winnipeg, Man., Can.
R. L. Newton	Va., E. West Va., D. C.	Richmond, Va.
L. E. Rood	Wisconsin	Kenosha, Wis.
John A. Rose	Florida and Georgia	Jacksonville, Fla.
H. D. Snyder	Michigan	Grand Rapids, Mich.
B. F. Spencer	E. Ohio, W. West Va., W. N. Y.	Warren, Ohio.
C. R. Spencer	Alabama, Mississippi and Tennessee	Memphis, Tenn.
H. A. White	Texas and Louisiana	New Orleans, La.
W. Ross Eaton	Arizona and New Mexico	Phoenix, Ariz.
H. A. Burgess	Idaho, Washington and Oregon	Portland, Ore.

Bingham Co. To Make $800 Trucks

CLEVELAND, O., July 11—The Bingham Mfg. Co. has taken over the plant and adjoining property of the Electric Locomotive & Engineering Co., at Lorain avenue and Lake Shore Railroad, and will go into automobile manufacturing. Plans now outlined call for the manufacture of a light delivery truck to sell at about $800. Officials claim it will be the cheapest truck for its capacity made in the country. The car will have a 25-horsepower motor, 114-inch wheelbase, and its bed will be 42 by 78 by 52½ inches. It is expected to turn out about thirty cars a month at first and to increase to 100 cars a month later. The capacity is estimated at 500 cars a month.

Tabulation Showing Registrations of Automobiles, Trucks and Drivers in Massachusetts in 1914 to July

	First 6 Months of 1913 and 1914.			Total for Entire 12 Mo. of 1913, within Increase and Decrease for First 6 Mo. of 1914.	
	1913	1914	Increase	12 Mo. 1913	Inc. or Dec.
Automobiles	53,628	64,717	11,089	62,660	2,057
Motor cycles	5,555	6,359	804	7,127	*768
Manufacturers and dealers	1,266	1,443	217	1,330	*113
Operators	9,679	11,525	1,846	17,009	*5,474
Chauffeurs	3,028	2,795	*233	5,233	*2,428
Operator renewals	26,429	32,238	5,809	40,858	*8,620
Chauffeur renewals	9,183	11,140	1,957	17,934	*5,794
Receipts	$646,323.09	$780,363.69	$134,040.60	$764,153.51	$16,210.18

*Decrease.

Interchangeable Wire Wheel, Packard Patent, for Kardo?

Letters of a Broad Basic Character Date Back to Early Application in 1901

WASHINGTON, D. C., July 14—What might prove to be an important addition to the group of Kardo patents was issued today. The patent covers demountable wire wheels which may be used interchangeably on the front and rear axle. It was issued to the Packard Motor Car Co. on an old application of Edward P. Cowles who was at one time employed by the Packard company in Warren, O.

This patent shows on its face that it was filed in 1912, but as it is an offshoot of an earlier application filed in 1901, its date is carried back 13 years to the early days of the automobile industry.

As may be expected from its early date, the claims are broad, covering the use of removable wheels which may be interchangeably used on the front and rear hubs, claim 7 for instance, reading as follows:

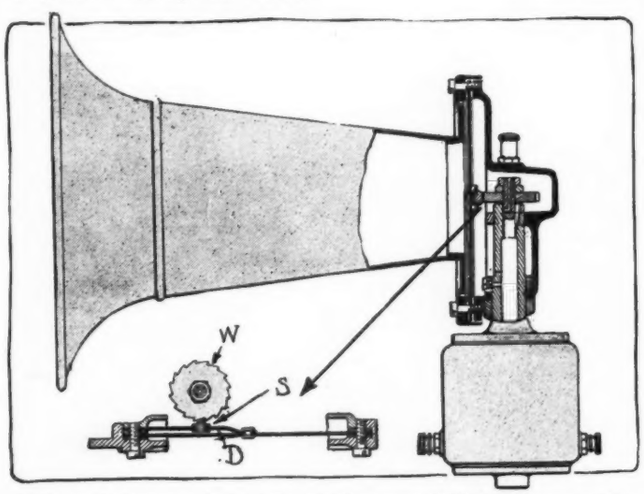
"In a motor vehicle, the combination with a front and rear stationary axle of a steering spindle pivoted at the end of the front axle, a hub-receiving member surrounding and freely rotatable upon said spindle, a driven hub-receiving member at the end of said rear axle, and wheels having hubs adapted to be removably secured, interchangeably, to said hub-receiving members."

Mr. Cowles' general idea is well expressed in his specification, where he says, "By simply removing the nuts the wheels can be interchanged, or in case of extended journeys an extra wheel carried on the carriage can be quickly and conveniently put on to replace a disabled one, without disturbing the ball or roller bearings in any way."

It is not known at the present time just what use the Packard company will make of this patent but it is reported on authority that the Kardo Co. will take it over to use in connection with the axle patents which it acquired recently from the Packard, the Peerless, and the American Ball Bearing companies.

Protest Against Truck Demonstration Tax

NEW YORK CITY, July 11—A protest against the demonstration tax now imposed upon motor truck dealers in this city has been lodged by the various dealers in this city with the Merchants' Assn. Manufacturers of and dealers in automobiles are required by the Callan automobile law to take out a general license which covers all of their vehicles prior to sale, such vehicles being identified by a single license number. But these vehicles are not allowed to be used for hire for private use. It is, however, necessary, particularly in the case of motor trucks, to demonstrate the capacity of the truck before a sale can be made. These demonstrations often show the truck in operation under the same conditions as it would be used by the owner.



Subject of Klaxon patent suit, showing non-rigid elastic connection D between driver W and the diaphragm

The Automobile Bureau of the Secretary of State's office holds that demonstrations with loads is a violation of the requirements of the law and demands that the manufacturers in such cases take out owners' licenses for these demonstrating trucks. This would compel the payment by the manufacturers in some cases of several thousand dollars annually for license fees.

The failure to comply with this law, that is, the taking out of both an owner's license and also a general license required of the manufacturers, makes the driver liable to arrest and fine.

Simms Spark Plug Patent Valid

DETROIT, MICH., July 11—In the case of the Frontier Specialty Co. against the Heinze Electric Co. for infringement of Simms Patent 642,167 covering a priming spark plug construction, final decree has been entered in favor of the complainant. The Court held that the patent is good and valid as is the title of the complainant and that the defendant infringed claims 1 to 6 inclusive and the defendant has been enjoined from further infringement of the patent. All question of damages, etc., has been settled.

Cadillac 2-Speed Axles Not Enjoined

DETROIT, MICH., July 10—Judge Sessions of the United States court, in Grand Rapids, Mich., refused to grant an injunction against the Cadillac Motor Car Co., Detroit, from continuing to make any more two-speed axles, as had been applied for by W. S. Austin, the Grand Rapids automobile manufacturer. The case will come up for final hearing August 11.

Weed Company Gets Default Order

NEW YORK CITY, July 13—In the case of the Parsons Non-Skid Co. and the Weed Chain Tire Grip Co. against the Leather Tire Goods Co., Inc., no answer was filed by the defendant in 20 days after the serving of the notice. Judge Hand has signed an order taking the bill of complaint pro confesso. The motion was made by Frederick S. Duncan, attorney for the complainants. The court ordered that the bill be taken pro confesso, "and that after the expiration of 30 days after the entry of this order a final decree may be entered herein."

A preliminary injunction on default was issued by Judge Mayer in favor of the Parsons Non-Skid Co. and the Weed Chain Tire Grip Co. in May in the U. S. District Court for the Southern District of New York.

The plaintiffs charge infringements on the Parsons patent No. 723,999, covering the well known Weed chain tire grip construction.

Klaxon Sues Newtone Dealer

NEW YORK CITY, July 13—The Lovell-McConnell Mfg. Co., Newark, N. J., has brought suit against Julius Bindrim, a Brooklyn dealer in automobile supplies selling Newtone and Newtone Superior horns. The plaintiffs allege infringement of patent No. 1,094,403, granted April 21, 1914, and covering a non-rigid elastic connection or coupling between the driver and diaphragm of an automobile horn, as shown at D in the illustration. The driving wheel is shown at W and the stirrup at S. These improvements are intended to render the sound less harsh and at the same time to reduce the wear and tear on the diaphragm. The Newtone and Newtone Superior horns referred to are models put upon the market since the beginning of the suit of the Lovell-McConnell company against the Automobile Supply Mfg. Co.

The Automobile Supply Mfg. Co. is defending the suit against Bindrim in the same manner in which it has defended all suits brought against its dealers.

Fined for Speeding—Appeals—Wins

NEW YORK CITY, July 14—The first speeding case to be tried in this city by a jury has resulted in a victory for an automobile owner and it only took the jury five minutes to acquit him after the magistrate had fined him $50.

Silas Axtell, an attorney, was the defendant. It seems that the whole case revolved around the question, whether going 18 miles an hour at 10 o'clock at night when the street was empty of any traffic was really breaking the law. The officer claimed he was going 26 miles an hour. Mr. Axtell proved he was going 18 miles an hour. The magistrate then fined him $50 for exceeding a speed law of 15 miles an hour in the crowded section of the city, with the

permission of an appeal. Mr. Axtell's evidence that the street was practically empty of any traffic, was ruled out.

The appeal came yesterday before Judge Crain in General Sessions and the owner was acquitted. The judge stated that a speed of 15 to 20 miles an hour is safe when the streets are not crowded and when the driving is not reckless. The same testimony heard by the magistrate went before the jury. The ordinance involved:

1. Rates of Speed—No person shall operate, drive or propel, and no owner thereof riding thereon or therein shall cause or permit to be operated, driven or propelled, on any public highway in the city of New York, any motor vehicle recklessly or negligently, or at a speed or in a manner so as to endanger, or to be likely to endanger, the life or limb or property of any person, provided, that a rate of speed exceeding 15 miles an hour shall constitute prima facie evidence of a rate of speed and manner of driving prohibited as aforesaid and of a violation of the provisions of this section; provided further, that a rate of speed exceeding 20 miles per hour shall constitute a rate of speed and manner of driving prohibited as aforesaid and in violation of the provisions of this section; provided further, however, that a rate of speed exceeding 25 miles per hour on public highways where the same pass through country or outlying sections which are substantially undeveloped and sparsely settled, shall constitute a rate of speed and manner of driving prohibited as aforesaid and in violation of the provisions of this section.

This ordinance which became effective June 1, 1913, gives persons driving automobiles the privilege to travel the streets of New York at the rate of 20 miles per hour, but, in the unusual language of the ordinance, if the speed exceeds 15 miles it will constitute prima facie evidence of recklessness or negligence.

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WASHINGTON, D. C., July 9—A drawback allowance was today granted by the treasury department on the exportation of automobile windshields manufactured by the Diamond Mfg. Co., Detroit, Mich., with the use of imported glass.

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Stewart-Warner Charges Patent Infringement

CHICAGO, ILL., July 13—Suit has been brought in the United States District Court by the Stewart-Warner Speedometer Corp., Chicago, against the National Carbon Co., Cleveland, for alleged infringement of a Stewart magnetic-type speedometer. This is an amendment to the original bill filed a few months ago against the American Eveready Co., New York with offices in this city. The American Eveready Co. and the National Carbon Co. have consolidated and the Chicago branch, now called the American Eveready Works of the National Carbon Co., was the original defendant. The American Eveready Co. states that it will fight the case.

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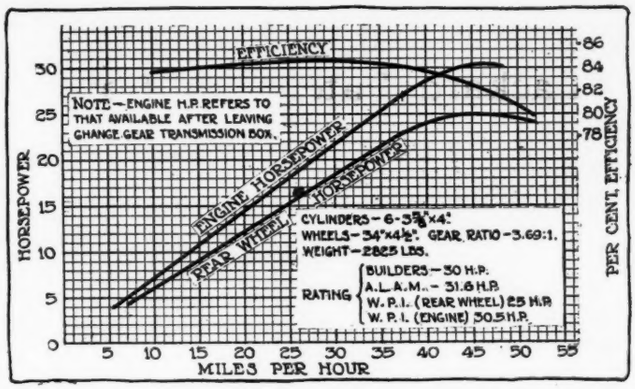
Ball Bearings in Customs Auction

CLEVELAND, O., July 9—Eleven cases of ball bearings will be sold at public auction on August 11, 1914, at the Custom House, this city, at 10:30 A. M. The cartons containing the balls are printed, "Best Quality Diamond Cast Steel Balls," manufactured by the Auto Machinery Co., Ltd., Coventry, England. The dutiable value is $4,070. The duty at 35 per cent. is $1,424.50 and the home value is $5,494.50. A detailed description of this merchandise can be obtained at Room 214, Federal Building, Cleveland. Samples will be forwarded to the collector of customs in the cities of those interested.



Curves showing the results of a test on the efficiency of the Franklin 6-30

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Detroit Section of E. V. A. A. Organized

DETROIT, MICH., July 9—For the purpose of further promoting the popularity of electric vehicles, both for pleasure and for commercial usage, a Detroit section of the Electric Vehicle Association of America has been formed, of which J. W. Brennan, purchasing agent of the Edison Illuminating Company, Detroit, is temporary chairman.

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Franklin Shows 84.4 Per Cent. Efficiency

WORCESTER, MASS., July 8—Final reports of a test on the Franklin 6-30 chassis held in the automobile testing plant of the Worcester Polytechnic Institute of this city show an average efficiency of 84.4 per cent. in the power transmission of the car at ordinary driving speeds.

In making the test the car was run on direct gear. The rear wheels rested on steel drums which were connected to water brakes which absorbed and measured the power. In this way a reading was secured on the power that would be available for driving the car along the road at any given speed. Readings were taken at car speeds of from 5 to 50 miles an hour and the results plotted in the curve shown herewith.

The efficiency given is the ratio of the power delivered at the wheels to that delivered by the engine. Thus at 35 miles an hour if the motor is delivering 25.5 horsepower and the wheels are delivering 21.5 the car is 84.4 per cent. efficient and 15.6 per cent. is being lost in tire friction, slippage and internal losses such as bearing friction, etc. The results of the test are certified by the Institute.

Bosch Buys Rushmore Interests

NEW YORK CITY, July 8—The Bosch Magneto Company has bought the plants and the entire business of the Rushmore Dynamo Works, of Plainfield, N. J. The completion of this deal, which has been pending for some months, now gives the Bosch company two factories in which to carry out the combined business of the merger.

All the contracts and service obligations of the former Rushmore company will be carried on, and it is the present intention to carry on the Rushmore line as it was before the combination took place, with such refinements and additions as time may suggest. The Plainfield plant has a floor space of 100,000 square feet and at the present time employs a force of about 700 men. This, added to the Springfield plant of the Bosch company, practically doubles the facilities for manufacturing and now puts the Bosch company in a position to accept orders for any quantity of the full line of electric lighting and starting systems which will be manufactured.

The line of starting and lighting products which was formerly known as the Rushmore will now bear the name of Bosch-Rushmore, while the other Bosch products will still carry the name Bosch as heretofore. The government work in searchlights, etc., will also be continued.

While the manufacturing end of the Rushmore line will continue much as it was under the direction of Bosch officers, the sales and service work will be handled through the Bosch organization. The 239 service stations that have been built up by the Bosch company will now take care of the service work for the entire business. Victor Kliesrath, as chief engineer, and C. M. Wills, as factory superintendent, will supervise the work under their jurisdiction in both plants of the company.

The Rushmore company has been established for over 20 years, having specialized during that time in the production of dynamos for train lighting and arc lights. They became interested in the automobile lighting problem at an early date and then finally in the production of an electric starter. This full line, which was described in THE AUTOMOBILE for November 6, 1913, and augmented by another light starting motor, as described in the issue of May 14, will be continued. In addition, the Bosch company is manufacturing a starting and lighting system of their own. Both the Bosch and Bosch-Rushmore systems operate at 12 volts. The Bosch starting motor uses an over-running clutch and the Bosch-Rushmore a flywheel installation.

Detroit Dealers Move 12,500 Cars in 1914

No Indication of Depression in Contiguous Region—Business Generally Better

DETROIT, MICH., July 14—Detroit automobile dealers have sold during the first 6 months of this year approximately 12,436 automobiles. Eighteen of the local dealers, by their own figures, have sold 10,236 machines, and adding to this the estimate of 1200 machines sold by dealers who have not given their definite figures gives the total of 12,436.

It does not mean that this number of automobiles have been sold in Detroit and vicinity, as some of the dealers have practically all of the State of Michigan. Others have but a few counties.

In general, business this year has been much better with Detroit dealers than a year ago, in spite of the depression due to general financial conditions and that brought about by the Mexican war. Ninety-five per cent. of the Detroit dealers state they have had a better year during the first 6 months of this season than during the corresponding 6 months of 1913. The remaining 5 per cent. are not optimistic.

Practically all of the dealers are looking forward to good business for 1915, some of them having already booked large orders. Nearly half of the dealers this year experienced a shortage of cars at one time or another, and with some of them the shortage during the months of May and June was an important factor.

The following extracts from individual reports of the different companies show the general tendency of business during the first six months of the year:

Buick—Business for the first 3 months of this year was 100 per cent. better than for the 6 months a year ago. We were sold out by March 16. Since then we have turned down 316 orders. We have already booked orders for 136 1915 cars.—C. C. Starkweather, Branch Manager.

Car-Nation and Keeton—We started delivering the little Car-Nation light cars only the latter part of April and have sold several hundred, while the sales of the high-priced Keeton have been most satisfactory. The general outlook is very good—Lininger-McHugh Co.

Cartercar—Our records show 25 per cent. increase over corresponding period a year ago. Have hardly been able to get cars during last 3 months.—L. Williams.

Chalmers, Pierce-Arrow, R. & L.—Business increase 25 per cent. over a year ago. Demand for cars very strong during last month.—Neumann, Lane Co.

Chevrolet—Have done 50 per cent. better business than a year ago.—Chevrolet Motor Co.

Detroiter—Business is good, but there has been general unrest so that a high mark in sales has not been reached. Conditions are beginning to look better.

Ford Business Gains 60 Per Cent.

Ford—Business 60 per cent. better than 1913. June has been our best month, and is 100 per cent. above last year. Have sold 5,200 cars, or 2,200 more than same period last year. Our territory is entire state of Michigan, less five counties around Grand Rapids and the upper peninsula.—Ford Motor Co. Detroit Branch.

Grant—From March to July 1 have sold 165 cars. Conditions are improving and 1915 will be a big year.—Geo. C. Waite.

Hudson—Business 100 per cent. better than in 1913. Have 1915 models on hand and getting splendid business.—E. Bemb, Bemb-Robinson Co.

Hupmobile—Business 40 to 45 per cent. better than last year. Have not felt so-called business depression.—Grasser Motor Car Co.

Krit—During first 6 months of this year have sold only five less cars than during the preceding 14 months. We handle Detroit and Wayne County only. Business 50 per cent. better than last year.—H. L. Davies.

Lozier and Paige—From May 1 to July 1 have sold 100 more cars than a year ago during same period. On one model we are twenty-five cars behind deliveries now.—Wetmore-Quinn Co.

Maxwell 100 Per Cent. Ahead of 1913

Maxwell—Have sold close to 700 cars during first half of 1914, which represents an increase of 100 per cent. over last year, and could have increased our business 150 per cent. if we could have obtained cars. For last three months have been shy 100 cars per month in deliveries.—Cunningham Auto Co.

Oakland—Business 20 per cent. better than first 6 months of last year. Could have sold 40 or 50 more cars up to July 1 if we could have had them. Our territory, Wayne County only.—Detroit Oakland Branch.

Oldsmobile—Have disposed of 25 per cent. more cars than last year. Outlook for 1915 good.—Detroit Oldsmobile Branch.

Overland—Have sold a few less than 600 cars, and of these 60 per cent. right in Detroit. Business 100 per cent. better than a year ago. Our territory only five counties in state. During last 2 months we did $200,000 worth of business.—Overland Motor Car Co.

Packard—Business satisfactory as it has always been.—Standard Auto Co.

Couldn't Get Enough Cars

Reo and Mitchell—Have never had a better year than 1914 so far, having sold 600 cars in the Reo territory of nine and one-half counties, and the Mitchell in one-half the state. Three-quarters of our sales were made in Detroit and Wayne County. This business would have been 50 per cent. bigger if we had had the cars to sell. Our records show that in June we could have sold 200 more cars. Business 65 per cent. ahead of last year.—M. A. Young.

Saxon—In 4 months have sold 400 cars. Could have sold 200 more if we could have gotten them.—T. J. Doyle.

Business Never So Good—Studebaker

Studebaker—During the 8 years I have been in the automobile business, business has never been as good as this year. We have done close to 30 per cent. better during the first half of 1914 than during the corresponding 6 months of 1913. During the last 3 or 4 weeks we could not get another four and thus lost about 120 to 125 sales in less than one month. The business in sixes has been nothing short of surprising. I think the outlook for the future business has never been better and estimate that

Market Reports for the Week

MARKET prices in general remained constant this week. A weaker tone in a few of the metal products developed. Both electrolytic and Lake copper dropped in prices, due to a small demand. Tin had a fluctuating week of it. Rising to $32.60 on Friday, it suddenly broke, closing on Tuesday at $31.50 per 100 pounds. This reduction in price was in sympathy with that in London, which occurred on the same day. There was very little demand from either consumers or speculators. Prices were generally steady in the oils and lubricants market. Cottonseed oil went up $.09 per barrel due to brisk trading conditions. The rubber market in this city was firmer this week, especially for plantation. Fine Up-River Para rose $.01.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.05¾	.05¾	.05¾	.05¾	.05¾	.05¾	.....
Beams & Channels, 100 lbs.....	1.26	1.26	1.26	1.26	1.26	1.26	.....
Bessemer Steel, ton 19.00	19.00	19.00	19.00	19.00	19.00	.....	
Copper, Elec., lb.	.13⅞	.13⅞	.13⅝	.13⅝	.13⅝	.13⅝	— .00⅛
Copper, Lake, lb..	.13⅞	.13⅞	.13¾	.13¾	.13¾	.13¾	— .00⅛
Cottonseed Oil, bbl.	7.21	7.21	7.23	7.28	7.31	7.30	+ .09
Cyanide Potash, lb.	.17	.17	.17	.17	.17	.17	.....
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	.....
Gasoline, Auto, bbl.	.14	.14	.14	.14	.14	.14	.....
Lard Oil, prime..	.93	.93	.93	.93	.93	.93	.....
Lead, 100 lbs.....	3.90	3.90	3.90	3.90	3.90	3.90	.....
Linseed Oil	.54	.54	.54	.54	.55	.55	.....
Open-Hearth Steel, ton 19.00	19.00	19.00	19.00	19.00	19.00	.....	
Petroleum, bbl., Kans., crude...	.75	.75	.75	.75	.75	.75	.....
Petroleum, bbl., Pa., crude	1.75	1.75	1.75	1.75	1.75	1.75	.....
Rapeseed Oil, refined	.59	.59	.59	.59	.59	.59	.....
Rubber, Fine Up-River, Para....	.69	.70	.70	.70	.70	.70	+ .01
Silk, raw, Ital....	..	4.95	..	..	4.90	4.95	.....
Silk, raw, Japan..	..	4.33	..	..	4.35	4.35	+ .02
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	.....
Tin, 100 lb.....31.95	31.55	32.60	32.50	32.25	31.50	— .45	
Tire Scrap	.04¾	.04¾	.04¾	.04¾	.04¾	.04¾	.....

1915 will be the biggest year we ever had. Conditions are good all over the state, the increasing sales coming from all over and no one particular section of Michigan.—Sales Manager Detroit Studebaker Branch.

Winton—Business 50 per cent. ahead of last year. Were sold out May 18. Business for 1915 is 100 per cent. ahead of the business of a year ago.—Winton Detroit Branch.

New Federal Factories To Cost $500,000

MILWAUKEE, WIS., July 13—Officials of the Federal Rubber Mfg. Co. celebrated the third anniversary of the company's existence on July 1, by giving orders for the erection of new factory buildings to cost over $500,000. Work is already under way on the new structures. When completed the new buildings will mean an increase of 150,000 square feet of floor space, making 450,000 square feet in the entire factory. There are 1,500 employees on the Federal payroll, More men will be employed as soon as the additional factory space is available.

Superintendent Hutchens is already at work on the buildings for 1915. These will consist of a separate building 60 feet by 497 feet with six stories and basement to four of the present buildings —all 50 by 50 feet and five stories in height. Brick and mill construction will be used throughout, this having been found to be the most desirable for purposes of rubber manufacture. Among the buildings on which work has been started is the addition to the power plant. This will contain two new boilers of the latest water tube type, capable of delivering 1,000 horsepower to the dynamos. Overhead coal bunkers will be arranged in such manner as to eliminate the handling of fuel by employees from the time it leaves the freight car until it enters the automatic stokers at the base of the furnace. These coal bunkers will be 700 tons capacity.

In addition to new boilers, a 1,000-kilowatt low pressure, exhaust steam turbine will be installed. This will be directly connected to three wire current direct generator with jet condenser and cooling tower. This will increase the electric power generated formerly by one-third. Enough space will be provided in the new building to take care of one more of the big turbines, which will probably be installed during the coming year.

Superintendent Hutchens estimates that over $1,000,000 has been expended in new machinery and buildings in the past 3 years. Of the 8 acres owned by the Federal company, 6½ acres are covered with buildings, and a big portion of the remainder will be placed under roof by the end of next season.

Overland Plans 75,000 Cars for Next Year

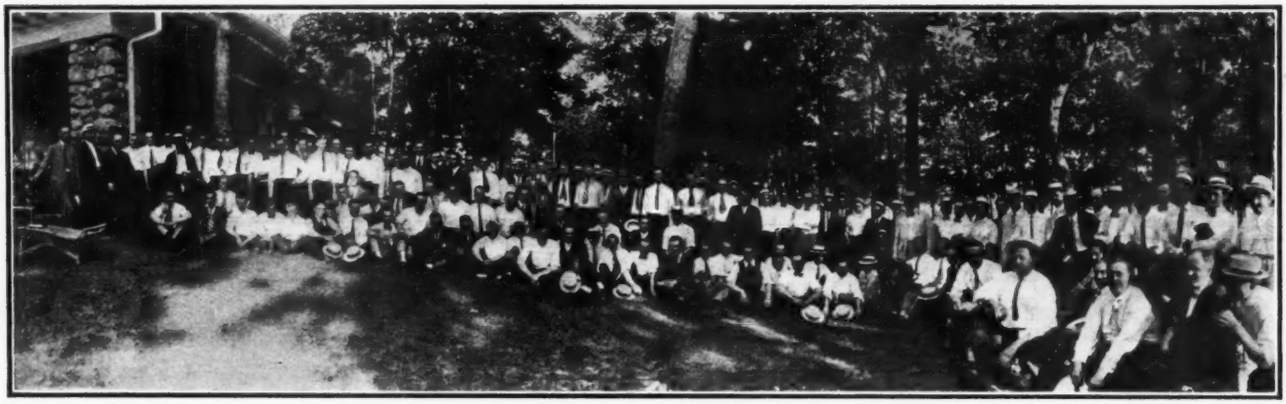
LONDON, ENGLAND, July 10—John R. Willys, president of the Willys-Overland Co., is quoted as saying that he expects to turn out 75,000 automobiles from the factories of his company during the next 12 months. Last year, he said, the company manufactured 45,000 cars. Mr. Willys also stated that the company expects to ship 7,500 automobiles to Europe next year.

Automobile Securities Quotations

NEW YORK CITY, July 15—The continued inactivity which has marked the automobile and allied securities market for several weeks has been apparent throughout the past 7 days. There were very few changes recorded, most of the stocks remaining at the same level as last week. Case gained 2 points. Firestone Tire 5, Goodyear 4 on the common and 1 on the preferred, Maxwell common gained ¼ point, Stewart, Warner common ¾ of a point, Studebaker common 1½ and preferred 2 points. The only other gains recorded were U. S. Rubber first preferred ½ point and Willys-Overland common 1 point. The losses suffered were very slight. The complete quotations for the past week follow:

Security	Wednesday		Thursday		Friday		Saturday		Monday		Tuesday		Week's	1913	
	Bid	Asked	Bid	Asked	Bid	Asked	Bid	Asked	Bid	Asked	Bid	Asked	Change	Bid	Asked
Ajax-Grieb Rubber Co. com	220	..	220	..	220	..	220	..	220	..	220	..	..	145	160
Ajax-Grieb Rubber Co. pfd	98	..	98	..	98	..	98	..	98	..	98	..	..	94	100
Aluminum Castings pfd	98	100	98	100	98	100	98	100	98	100	98	100	..	97	100
Case T. M. Co., J. I	83	92	83	92	83	91	81½	86	83	92	83	92	+2	..	..
Chalmers Motor Co. com	101	104	101	104	101	104	101	104	101	103	101	103	..	110	116
Chalmers Motor Co. pfd	94	97	94	97	94	97	94	97	94	95½	94	95½	..	98	102
Electric Storage Battery Co	51⅞	52	51⅞	52	51½	52	51½	52	50	52	50	52	—1	..	..
Firestone Tire & Rubber Co. com	300	305	300	305	300	305	300	305	305	308	305	308	+5	270	280
Firestone Tire & Rubber Co. pfd	108½	110	108½	110	108½	110	108½	110	108½	110	108½	110	..	103	105
Garford Co. pfd	75	85	75	85	75	85	75	85	75	85	75	85	..	85	95
General Motors Co. com	91½	92	91	93	91½	92½	90	93	91½	92½	91½	92½	— ¾	27⅞	30¼
General Motors Co. pfd	92¾	93	92½	93	92¾	93	92	93	92	93	92	93	..	73¼	77
B. F. Goodrich Co. com	24	24¾	25½	26	26⅝	26⅞	26½	26¾	26	27	26	27	+1	27½	29
B. F. Goodrich Co. pfd	88½	89½	88½	90	88½	89	88½	89	88	89	88	89	..	90¾	92¾
Goodyear Tire & Rubber Co. com	166	170	166	170	166	170	166	170	168	170	170	—174	+4	330	337
Goodyear Tire & Rubber Co. pfd	96	97½	96	97½	96	97½	96	97½	96½	99	97	— 98½	+1	98½	100
Gray & Davis Co. pfd	98	102	98	102	98	102	98	102	98	102½	98	102½	..	..	..
International Motor Co. com	..	3	..	3	..	3	..	3	..	3	..	3	..	3	5
International Motor Co. pfd	3	9	3	9	3	9	3	9	3	9	3	9	..	18	25
Kelly-Springfield Tire Co. com	56	60	56	60	55	60	55	60	56	58	55	60	—1	..	..
Kelly-Springfield Tire Co. 1st pfd	70	80	75	80	75	80	75	80	76	80	70	80	..	..	..
Kelly-Springfield Tire Co. 2d pfd	90	100	93	100	93	100	93	100	94	100	90	100	..	..	..
Lozier Motor Co. com	..	20	..	20	..	20	..	20	..	18	..	18	..	15	20
Lozier Motor Co. pfd	..	41	..	41	..	41	..	41	..	41	..	41	..	..	90
Maxwell Motor Co. com	14¾	15	14¾	15	14¾	15	14¾	15	14	15	14¾	15	— ¼	2¾	3¼
Maxwell Motor Co. 1st pfd	44	44¾	44½	45	44	45¼	43⅝	45	44½	46	43½	45	..	24	26
Maxwell Motor Co. 2d pfd	18	19½	18¼	19¼	17½	19	17½	19	17½	19	17	19	— ¾	6	8
Miller Rubber Co	138	140	138	140	138	140	138	140	138	140	138	140	..	133	137
New Departure Mfg. Co. com	125	127	125	127	125	127	125	127	125	127	125	127	..	..	..
New Departure Mfg. Co. pfd	105	108	105	108	105	108	105	108	105	108	105	108	..	..	..
Packard Motor Co. com	103	112	103	112	103	112	103	112	103	112	103	112	..	..	..
Packard Motor Co. pfd	97	100	97	100	97	100	97	100	97	100	97	100	..	..	..
Peerless Motor Co. com	10	17	10	17	10	17	10	17	10	17	10	17	..	40	50
Peerless Motor Co. pfd	..	50	..	50	..	50	..	50	..	50	..	50	..	..	96
Pope Mfg. Co. com	..	2	..	2	..	2	..	2	..	1	..	1	..	7	10
Pope Mfg. Co. pfd	..	4	..	4	..	4	..	4	..	3	..	3	..	27	33
Portage Rubber Co. com	..	30	..	30	..	30	..	30	..	30	..	30	..	..	45
Portage Rubber Co. pfd	..	90	..	90	..	90	..	90	..	90	..	90	..	..	90
*Reo Motor Truck Co	11¾	12¼	11¾	12¼	11¾	12¼	11¾	12¼	11½	12½	11½	12½	— ¼	10	11½
*Reo Motor Car Co	18	18½	18	18½	18	18½	18	18½	18	19	18	19	..	19	21
Rubber Goods Mfg. Co. pfd	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Russell Motor Co. com	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Russell Motor Co. pfd	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Splitdorf Electric Co. pfd	40	50	40	50	40	50	40	50	40	50	40	50	..	..	..
Stewart Warner Speedometer Corp. com	51¼	52	51¼	52	51¼	52	51¼	52	52	53	52	53	+ ¾	..	..
Stewart Warner Speedometer Corp. pfd	99	101	99	101	99	101	99	101	99	101	99	101	..	..	..
Studebaker Co. com	31½	32	31¾	32	31⅞	32⅜	31¼	32	31	32	31	32	+1½	22½	24¾
Studebaker Co. pfd	83	86	82	86	83	85	83	86	82	86	82	86	+2	82	87
Swinehart Tire & Rubber Co	85	87	85	87	85	87	85	87	85	87	85	87	..	85	88
Texas Company	143	144	142½	143	141	143	141	142	141	143	141	143	—1	..	..
U. S. Rubber Co. com	60	60¼	59¾	60¼	59½	60	59½	60	57½	58½	57½	58½	—2	59½	60
U. S. Rubber Co. 1st pfd	103¾	104	103⅞	104	103	103⅞	103	104	103	104	103	104	+ ½	104	105
Vacuum Oil Co	220	223	220	223	220	223	220	223	218	222	218	220	—1	..	..
White Co. pfd	107	110	107	110	107	110	107	110	107	110	107	110	..	102	104
Willys-Overland Co. com	87	89	88½	89	89½	90½	90	91¾	89	91	90	91	+1	57½	62
Willys-Overland Co. pfd	95	96½	95	95½	95	96	95¼	95½	94	96	95	96	..	85	90

*The par value of these stocks is $10; all others $100.



Maxwell Motor Co.'s district salesmen, heads of departments and college boys employed in the factories enjoying an outing at the summer home of Walter E. Flanders, president of the company

Gasoline Prices Are Still Tumbling

Competition and a Reaction in the Crude Oil Market Among Contributing Factors

NEW YORK CITY, July 14—Gasoline prices throughout the country are getting lower. However, every reduction in the price of gasoline is not the result of competition alone. The recent reaction in the crude oil market had a great bearing on the lowering of these prices and not nearly so much price cutting would have been done had this not happened. However, the biggest reductions in prices have come where most competition is offered. The following list gives the prices in different sections of the country:

New York City	$0.23	St. Louis, Mo.	$0.11
Los Angeles, Cal.	.12	Jersey City, N. J.	.09
Detroit, Mich.	.11	Dallas, Tex.	.08

Conditions in this city have kept the prices a little higher than in the surrounding country. Since the beginning of July, New York garage owners have generally reduced the price of gasoline from $.25 to $.22 and $.23 a gallon, and it is likely that further reductions will be made in the near future.

The initial step in reducing prices was taken at a meeting of garage owners, started by the West Side Garage Owners' Assn., last week. Arangements are now progressing towards the holding of another meeting of the garage men to effect a reorganization in the garage business. Under existing conditions the cost of car storage generally charged by the garage does not cover expenses. In order to make a profit the garage owners kept up the price of gasoline. Until the recent cut in prices was effected, the New York garages were paying $.14 a gallon for their gasoline and retailing it at $.25. To equalize conditions, it is proposed to raise the storage charges and lower the price of gasoline. It is thought that in this way it will be possible to bring the price of gasoline at the garages below $.20 a gallon.

The strongest competition in the East is found in Hudson county, N. J., across the Hudson from New York City, where gasoline can be bought as low as $.09 a gallon. Most of the gasoline in that territory is supplied by the Standard Oil Co. of New Jersey, Gulf Refining Co., and the Texas Co.

In the South gasoline prices are lower than they have been for a long period. In Texas gasoline is being sold to the dealers in some instances as low as $.08 a gallon.

In the middle West gasoline is sold below $.11, more frequently in Missouri.

In California several cuts in gasoline prices have recently been announced by the Standard Oil Co. of California, and these have been followed by the other companies.

3,256 Cars and Trucks Exported in May

WASHINGTON, D. C., July 15—*Special Telegram*—Ninety-nine commercial cars valued at $127,024 and 3,157 passenger cars valued at $2,857,601 were exported in May, as against 141 commercial cars valued at $236,383, and 2,895 passenger cars, valued at $2,918,806, exported in May a year ago. During the 11 months' period ended May the exports were 694 commercial cars, value $1,061,354 and 26,324 passenger cars, value $23,522,081 in 1914, and 878 commercial cars, value $1,569,750 and 22,254 passenger cars, value $22,252,032 in 1913. Our best customer in May was Canada, which imported 764 cars, valued at $941,345. United Kingdom was second with 663 cars, valued at $556,753, and British Oceania, third with 466 cars, valued at $416,259.

Charge Stock Issuance Fraud by U. S. L. Directors

BUFFALO, N. Y., July 14—Judge Hazel in federal district court Monday afternoon named James O. Moore of Buffalo, Guy M. Walker of New York City and A. Henry Ackerman of Brooklyn, N. Y., as receivers for the United States Light & Heating Co., directing them to continue business of the concern. The court fixed a joint bond of $100,000 for the three receivers. Mr. Ackerman is at present manager of the Niagara Falls plant of the company.

Alleging that in the past 5 years directors of the United States Light & Heating Co., a Maine corporation, with a plant here in Buffalo, issued in an illegal manner $9,500,000 worth of stock, several petitioners in United States district court added to their application for the appointment of a receiver charges of fraud and mismanagement. Issuing of stock in five particular cases is claimed by the petitioners and complainants as having been in violation of the law.

The stock issued to William Hawley, a director of New York, said to be worth $100,000, is alleged a fraud, stock reported worth $10,000 awarded to Sanford Adler of New York is cited in bill of complaint as being fraudulent and also the reported issuing of stock said to be worth $100,000 to J. Allen Smith of New York, at the time of the transaction vice-president of the company, and Charles A. Starbuck chairman of the directors. The issuing of stock to Edmond Hooley, inventor, of Niagara Falls, in exchange for patent rights secured by the inventor is illegal according to the complainants because the stock, they maintain, was worthless. The petitioners for appointment of a receiver by the court and complainants in an action to determine whether or not the affairs of the company were mismanaged and the directors guilty of fraud and illegal operations in office are the Picher Lead Company, Joplin, Missouri; the Buffalo Drill Company and Frederick R. Humpage, of 22 Bidwell Parkway, former head here of the E. R. Thomas Motor Car Company, creditors and stockholders and certain associate creditors and stockholders.

The directors of the company, some of whom are liable to face prosecution in the event that the petitioning creditors establish proof in their contentions of fraud and illegal practices, and William Hawley, Walter S. Crandall, Charles A. Starbuck, J. Allen Smith, Theodore P. Shonts and John A. Fleicher.

Since the first of the present year the affairs of the company have been satisfactorily carried on by Frederick R. Humpage of Buffalo and Guy M. Walker and J. A. Fleicher of New York City as a stockholders' committee. The petitioning creditors do not desire that the factories of the United States Light & Heating Company be closed down, and in court yesterday afternoon they offered in eivdence contracts to show that considerable business is offered the plant and that money perhaps sufficient to meet all obligations can be secured within the next several months.

What the petitioners maintain they do want is a thorough review of the operations of every defendant in the actions and an adjustment of the company's affairs. The concern claims assets of $3,000,000 with reported liabilities of $900,000. The plant and main offices of the company are located in Niagara Falls, and during the absence of J. Allen Smith, vice-president and general manager, who now is in Europe, the concern has been managed by Henry Ackerman, Buffalo, who in conjunction with the stockholders' committee has profitably run the business during the past few months.

Through the complaint filed by Frederick Humpage it was shown where various alleged fictitious stockholders' claims had been made by stockholders and large and exorbitant sums had been transferred to their personal use. Another important factor in the case is the fact that through John A. Fleicher, a stockholder in the company, the famous Brady estate of New York, is interested to the extent of several thousands of dollars.

Counsel for the company announced today that it will contest the receivership in the courts. The statement made advances the claim that to bring about the receivership it was necessary that the company receive preliminary notice and that no such notice was given.

Billings & Spencer To Increase Force

HARTFORD, CONN., July 10—Satisfaction is keen in local industrial circles now that the Billings & Spencer Co. has taken over the plant of the Columbia Motor Car Co., which has been closed down for some time past and dismantled of mechanical equipment. The Billings & Spencer Co., one of the soundest of the old line local industries took immediate possession. It is said an increase in the working force will result from the purchase. During the slack period with the former owners work was done in the shop for Billings & Spencer. The company has outgrown its present quarters. The transfer of the business to the new possession will be made gradually. In this way there will be no interruption in the work at the old plant. The Billings & Spencer company's progress has been consistent with the expansion of the automobile industry. With the new purchase there is ample room for expansion as the tract comprises over eight acres and furthermore shipping facilities are infinitely better at the new location as spur tracks from the main line of the New York, New Haven & Hartford road run into the factory yard and buildings. Automobile forgings constitute a big share of the company's product and most of these are shipped to the middle western manufacturers of cars. The company manufactures 23 different kinds of wrenches and in specializing on forged automobile accessories.

Quantity Production Means Cyclecar Success

By Hon. Mitchell May, Secretary of State

AN interesting phenomenon of the last year or so is the development of a motor vehicle intermediate between the motorcycle and the ordinary motor car. The name cyclecar has been invented for this hybrid machine; and it is a name that should stay, since it embodies the two principles upon which the vehicles are made,—viz., that they chiefly resemble motor cars so far as the body is concerned and motorcycles in respect to the chassis. The difference between a motorcycle and a motor car has never been legally defined in this state, but custom regards as motorcycles all motor vehicles having three wheels or less. The four-wheeled cyclecar is always a motor car, whereas the three-wheeled one might or might not be.

Big Makers Would Help

The cyclecar is still in its infancy and it is not without interest to consider at this early stage its probable line of development. There are a number now in use; some with seats arranged in tandem and some abreast and with every form of gearing and transmission. So far, the output has been from the small maker rather than from the large motor car manufacturers. The latter are at present busy with the usual form of motor vehicle, and are little under pecuniary temptation to turn their activities into a new channel. There is no doubt that the large manufacturers would be able, if they took up the cyclecar, not only to improve it greatly, but even to introduce some of its simple features into the smaller motor cars. At present, the motor car is changing very little. The influence of cyclecar design bringing with it fresh ideas, should, therefore, be good. It will inevitably suggest here and there alternative ways of doing things which have too long been stereotyped. Precisely just what effects will be produced in this way, it would be impossible to predict, but a useful stimulus may be looked for.

The cyclecar is the direct descendant of the motorcycle and side car, just as the latter sprang from the bicycle. The effort needed for propulsion of the bicycle was too wearing to allow the combination to become popular. With mechanical power this objection vanished. A cyclecar chassis is much more lightly built than motor car chassis; besides, the steering is far more simple. Some designs are on the market for $400 and there is no reason why they should not become cheaper. With proper encouragement, the cyclecar should prove an exceedingly effective way of making motoring still more popular, particularly as a means of vacation touring. At present there are not many cyclecars in use in this state, but when there is introduced a cheap, reliable vehicle costing less than a motor car does now, and capable of carrying two persons and their luggage, the movement may be expected to grow until the production of cyclecars becomes one of the greatest industries in the country. So far, the great motor car manufacturers have stood aloof and it is not to be expected that much will be seen of the cyclecar during the present year. But a great field of possibilities awaits the maker whenever the demand tempts him to take advantage of the possibilities.

Hon. Mitchell May, secretary of state of New York

Price Is the Main Factor

However, the whole question of cyclecars revolves itself into one of price and, as manufacturers have already shown that cars of moderate power can be marketed at an exceedingly low figure, when turned out in sufficient quantities, the most probable solution of the cyclecar problem seems to be in a similar direction. But the question of relative comfort is sure to be the final criterion by which choice will be made. Great as have been the strides in motorcycle and side car constructions, in the shape of greater trustworthiness and increased comfort for both rider and passenger there is no doubt that many people regard the combination with distrust on account of the apparently exposed position of the rider and the cramped position of the passenger. The degree of comfort obtainable in a cyclecar depends on the amount of attention the makers are willing to bestow upon the springing and as soon as they realize that the buyer of a motor car does not care to be too crowded, a very great improvement will result. With the light weight which is characteristic of the cyclecar the designers should be able to construct good suspensions.

French Army Testing Trucks; 112 Compete for Subsidies

Rigorous Road Trials from July 6 to August 4 Begin and End with Examinations

PARIS, FRANCE, July 9—In this year's French military commercial vehicle trials to determine the type of trucks suitable for government subsidies, there are 112 entries, constituting the biggest number of commercial vehicles ever brought together for a competition in France. The event opened on June 29 with examination and verification of the competing machines. The trucks took the road on July 6 and with the exception of 3 rest days will be kept constantly on the move until the evening of August 4, when the survivors are submitted to a close technical examination. Going back to a previously tried system, the trucks are run over a varied set of roads around Versailles, returning to this town each evening. As Versailles is practically a suburb of Paris, and within a dozen miles of the great majority of the French factories, the choice of this centre is pleasing to manufacturers.

This year's trials differ from those of last year by the admission of tractors in addition to ordinary trucks. The four wheel drive machine is a type now being seriously encouraged by the army and likely to have a considerable application for commercial purposes. All the firms taking part in the trials are French, as required by the rules. The list is as follows, each firm entering from 2 to 8 trucks of different types: Berliet, Renault, Dewald, Clement-Bayard, Delaugere-Clayette, Cottin & Desgouttes, Blum, Rochet-Schneider, Barron & Vialle, Panhard & Levassor, La Buire, Peugeot, Aries, Saurer, Mors, Balachowsky & Caire, Schneider, De Dion Bouton, and Delahaye.

Results Out in French 4-Wheel Drive Tests

PARIS, FRANCE, July 9—After considerable delay, the official results have been published of the military four-wheel drive tractor competition held by the French army last March. This event, the first of its kind, took place across country and over military roads in the east of France, during which the machines were put to a particularly severe test, and was followed by a very close technical examination in the artillery headquarters at Vincennes, near Paris. In the following list merit points have been awarded for regularity of operation, hill climbing ability, economy in fuel and oil, and finally for the state of the mechanism at the end of the tests.

LIGHT TRACTORS

		Points
1	Latil No. 9	810.7
2	Panhard No. 2 (Knight motor)	773.6
3	Panhard No. 1 (Knight motor)	743.6

HEAVY TRACTORS

1	Renault No. 11	949.3
2	Renault No. 12	943.8
3	Latil No. 8	906.6
4	Latil No. 7	851.1
5	Panhard No. 3	832.7
6	Panhard No. 4	789
7	Schneider No. 13	805.7
8	Schneider No. 14	784.7

Sixteen Entries for Elgin Races

CHICAGO, ILL., July 14—One new entry for the Elgin road races of August 21-22 has been filed within the past week—that of Charles Erbstein's second Marmon, which will be driven by Lou Heinemann.

Eight cars are already nominated for both days, making a total of sixteen for the meet. These include E. J. Schroeder's Peugeot, E. V. Rickenbacher's Duesenberg, Oldfield's and Anderson's Stutzes, Grant's and Babcock's Sunbeams, and Patschke's Marmon. The Chicago Automobile Club is counting on six cars from the Moross group, including Tetzlaff, Hughes and Calson in Maxwells, Klein in the King, Brock in the Ray, and d'Alene in a Marmon. Spencer Wishart and Ed Pullen in Mercers are promised, and Finley Porter is rushing work on his new cars in order to start three of them at Elgin.

Bob Burman has promised positively to drive his Peugeot both days, and it is almost certain that Mulford will be here with a third Peugeot. Alex Sloan is figuring on starting two Cases, and Knipper in a National is another probability. De Palma, too, can be counted on as a certain starter, but it is not known which he will drive, a Mercedes or a Vauxhall. Two more Duesenbergs will be nominated, while there are probably a dozen other likely candidates.

An extra $1000 has been added to the prize money, making first each day worth $2000; second $700 and third $300. Harry Vissering, president of the Chicago Automobile Club, already has given $200 for the fastest lap the second day, while the first day is taken care of by Martin Kavanaugh, also a club member, who hangs up $200 for the first day.

Grand Prix Mercedes for Next Vanderbilt Race

NEW YORK CITY, July 11—One of the three Mercedes that took first, second and third place in the Grand Prix of France on July 4 will probably be a contender in the next Vanderbilt Cup race.

Paul Lacroix, the American agent for the Mercedes, has received instructions from E. J. Schroeder, owner of the Mercedes car which won the two last Vanderbilt cup races, to enter into negotiations with the Mercedes factory to obtain for him one of the Grand Prix racers, which Mr. Schroeder intends to compete with in the next Vanderbilt and Grand Prix races in California and the next Indianapolis 500-mile race.

It is probable that Ralph De Palma will drive this car in the three events, but if he is not secured it is most likely that either Lautenschlager, Wagner or Salzer will come over to drive in the races.

It is expected that one of these cars will be here before long. De Palma is now abroad expecting to conclude arrangements with the Mercedes factory to bring one over for the Elgin road race, where it will be entered by E. C. Patterson.

$4,650 in Prizes at Galveston Races

GALVESTON, TEX., July 10—Sixteen events are announced for the next big automobile race meet—the Galveston Beach Carnival, scheduled for July 30-31 and August 1 and 3. Events for all classes of racing cars are on the program and $4,650 in cash prizes is offered, together with numerous valuable trophies. An innovation this year will be a day devoted to amateur races exclusively.

Parade To Dedicate 1915 Motor Exposition

SAN FRANCISCO, CAL., July 7—A line of 25,000 automobiles, the largest number of cars ever brought together at one time in the United States, is expected for the 50-mile parade during the Automobile Day Festival of the Panama-Pacific International Exposition on July 15.

This important event will signalize the dedication of the space to be devoted to automobile exhibits at the exposition. Upon the conclusion of the parade, which will terminate upon the exposition grounds, the area set aside for automobile exhibits will be turned over to the automobile industry by Captain Asher Carter Baker, U. S. N., retired, director of the Division of Exhibits.

Tented Motor Show at Indiana Fair

INDIANAPOLIS, IND., July 13—The fall motor show, to be held at the Indiana State Fair here the week beginning September 7, promises to eclipse any motor show ever given by the Indianapolis Automobile Trade Association, under whose auspices it is to be held. The committee in charge of the show consists of Fred I. Willis, of the Hearsey-Willis Co.; George D. Wildhack, general traveler for the Oakland Motor Car Co., and John Orman, of the Premier Motor Manufacturing Co.

A tent 150 feet wide and 325 feet long is to be used. This will give 20,300 square feet of exhibiting space, exclusive of

Lining up for Montamarathon trophy race at Tacoma, July 4

aisles. It will be located on a prominent part of the fair grounds, near the Coliseum. Until August 22 space will be sold at ten cents a square foot, members of the association to be given the preference. After that date the price will be increased to twenty cents a square foot.

15,000 at Louisville Midsummer Show

LOUISVILLE, KY., July 11—Under the auspices of the Louisville Automobile Club this city's first annual midsummer automobile show was held last Thursday at Fontaine Ferry Park. Twenty exhibitors were represented in the display, which included gasoline pleasure cars, trucks and electrics. Many dealers handling some of the leading makes were unable to enter the exhibition because of their inability to secure models from their factories at this time, it was announced.

Optimism was in evidence everywhere among the dealers, and indications point to a splendid season next year. According to the majority of the dealers, business is much better than it was at this time in 1913, the principal complaint of the agents being that they cannot secure a sufficient number of cars from manufacturers. Local distributors are doing the bulk of their business out in the State, where the farmers and people living in small towns are purchasing cars in greater numbers than ever before. There seems to be the greatest demand for the machine selling in the neighorhobd of $1,000, and the small cars listed under $700 also have made great strides.

The midsummer show was staged in connection with a membership campaign being conducted by the Louisville Automobile Club. Fontaine Ferry, where the exhibition was held, is an amusement park. The event was designated as Automobile Day and about 15,000 people were in attendance.

Cadillac Owner Wins Consistency Trophy

DENVER, COL., July 10—The sweepstakes trophy for the best general average of consistent driving in the first annual All-Colorado Auto Derby, July 3, 4 and 5, was won by Harry W. Swigert, driving a Cadillac. Point cups for the five separate legs of the 280-mile run from Denver to Colorado Springs, Canon City, Pueblo and return were won respectively by Carl Ph. Schwalb in a Cadillac; Swigert, winner of grand prize; A. C. Lee in an Abbott-Detroit, E. H. Bull in a Franklin and Theodore Marx in a Locomobile.

The winning time for the entire course of 280 miles was 14 hours, 6 minutes and 15 seconds, which was within 9 minutes of the time secretly fixed by the timing committee as the most reasonable for covering the official route, namely, 14 hours and 15 minutes.

Tests of New Fuel Continue

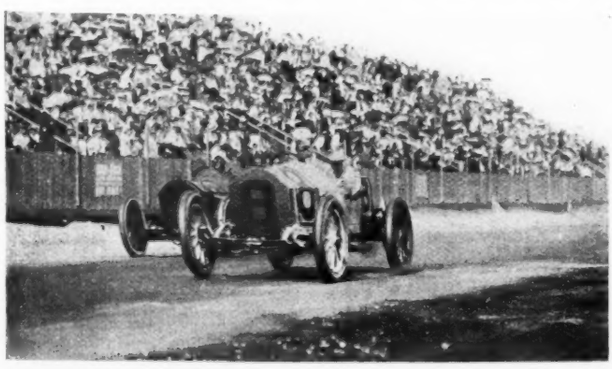
INDIANAPOLIS, IND., July 13—Experiments with the substitute for gasoline invented by John Andrews, of McKeesport, Pa., are still under way at the Indianapolis Motor Speedway and continue to attract wide attention. The experiments are being closely watched by Carl G. Fisher, president of the speedway company, and by chemists from other cities. It is understood steps are to be taken soon to place the substitute on the market.

The new fuel is distilled from water and chemicals. Andrews asserts it can be marketed at 5 or 6 cents a gallon. It can be made of any quality from 60 proof to 100 proof. The process of manufacture is rapid.

Several cars have been used in the experiments. A six-cylinder Cole using the substitute made 13.5 miles to the gallon, the substitute having a specific gravity of 60. Previously the same car made 12.9 miles to the gallon on 64-proof gasoline.

A National six-cylinder car made 16.5 miles to the gallon on 64-proof gasoline and later made 17.75 miles to the gallon on the substitute having a specific gravity of 60. Another National six-cylinder touring car, fully equipped, attained a speed of 56 miles an hour on 64-proof gasoline, then reached a speed of 60 miles an hour on 60-proof substitute.

A Marmon car made a continuous run of 116 miles on 9½ gallons of the substitute, an average of 12.2 miles to the gallon.



Cooper, in Stutz, winning 250-mile race at Tacoma, July 4

Rules Difficulties May Kill Wisconsin Tour

MILWAUKEE, WIS., July 13—There will be no revival of the Wisconsin State Automobile Assn. reliability tour for the Milwaukee Sentinel $1,000 trophy in 1914, and it looks as if the Badger motoring classic is dead for all time. Officers of the association claim that the A. A. A. will not grant a sanction for a grade 1 tour, nor permit the association to take its own steps to provide a stock car classification and registry. Therefore, for the second time, the 1,000-mile run is abandoned and unless the association makes good in 1915, there is scant hope that there will ever be another dealer's touring contest in Wisconsin, at least not under the W. S. A. A.'s auspices.

The tour was instituted in the summer of 1910 and proved a success. The trophy, which cost $1,000, was won by a Buick. In 1911 the Imperial was returned winner. Both tours were under the stringent grade 1 code of the A. A. A. In 1912 the promoter was not able to muster sufficient cars under this set of rules, so grade 3 regulations were invoked and all but three or four out of twenty-two cars came through with perfect scores and the Sentinel cup was not awarded, certificates and medals being distributed. In 1913 the W. S. A. A. ran up against the snag which put several other prospective contests in the United States out of business. The A. A. A. had no stock cars registered as required by grade 1 rules and could not grant the Badger promoters a sanction. The same situation confronts the Badgers this year.

Monihan Resigns from Cole Company

INDIANAPOLIS, IND., July 13—John Guy Monihan has severed his connection with the Cole Motor Car Co., this city, resigning the position of associate director of sales and advertising. Mr. Monihan states he will probably re-enter the automobile business this fall, but meanwhile will make an extensive automobile tour with his family.

Rudge-Whitworth Offers Prizes for Elgin

NEW YORK CITY, July 13—The Rudge-Whitworth Co., Ltd., Coventry, England, manufacturer of the Rudge-Whitworth detachable wire wheels, whose license is held in this country by the Standard Roller Bearing Co., Philadelphia, Pa., will offer the following prizes to the cars coming in first and second in the Elgin Road Race, held by the Chicago Automobile Club this year, August 21, provided the cars are equipped with Rudge-Whitworth detachable wire wheels: First, $200; second, $100.

Will Tour to Yellowstone Trail Meeting

MINNEAPOLIS, MINN., July 11—The automobile tourist caravan for the annual meeting of the Yellowstone Trail Association meeting, August 5 and 6, at Hunter Hot Springs, Mont., will leave Minneapolis July 27. Stops will be as follows: July 27, Montevideo; 28, Aberdeen, S. D.; 29, McIntosh, S. D.; 30, Marmarth, N. D.; 31, Miles City, Mont.; August 1, Billings, Mont.; August 3, Hunter. The association will lay plans at the convention for the government to open Yellowstone Park to motor cars and to extend the trail to Seattle. Government stone crushers from the Panama Canal Zone are expected to be loaned for the trail work.

Cyclecar National Association Elects New Directors

DETROIT, MICH., July 13—Active organization work has been inaugurated by the Cyclecar Manufacturers' National Assn. At a meeting in this city July 5 F. Ed. Spooner was elected secretary, with offices at 903 Free Press Building. Two vacancies in the board of directors were filled by the election of W. I. Twombly, of the Twombly Motor Corp., New York City, and W. Lumb, of the Flagler Cyclecar Co., Cheboygan, Mich. The makers at the meeting decided to encourage the promotion of contests of every character, including track races, hill climbs, etc.

Factory Miscellany

DENBY Truck Opens Factory—The Denby Motor Truck Co. has started business in Detroit with offices at 2036 Dime Bank Building, and a factory at Dubois and Franklin street. The factory has 20,000 square feet of floor space, which is to be doubled later, option having been taken on the additional room. Contracts have been placed for material for 500 trucks for the first year, with an increase to 1,000 trucks as the business develops. Particulars regarding the truck that will be manufactured are withheld at present but it will run from 1,500 pounds to 1-ton in capacity, according to reports. Garvin Denby is president and general manager of the company; J. Walter Drake is vice-president of the new company; Arthur Webster is secretary, and Edwin Denby, treasurer; L. C. Freeman is engineer, while R. P. Spencer is sales manager, with R. F. Moore advertising manager.

Southern Tire Co. Builds—The Southern Tire & Rubber Co., Augusta, Ga., will erect a plant to manufacture tires, etc. It will be 50 by 200 feet, with brick construction, and will cost approximately $9,000.

Will Furnish Atlas Spare Parts—The Auto Parts & Repair Co., Springfield, Mass., has purchased the repair end of the Atlas Motor Car Co. and can furnish all parts for 2-cycle engines at all times.

Simplex Co. Manufacturing Rims—The Simplex Demountable Rim Co., Milwaukee, has been organized to manufacture automobile rims and tire appliances. The capital stock is $150,000 and the promoters are M. Rosenheimer, W. J. Sarres and M. H. Rosenheimer. It has been engaged in manufacturing on a small scale for several months, but intends to lease larger factory quarters at once.

Richard Co. Will Build—The Richard Automobile Mfg. Co., Cleveland, expects shortly to begin the erection of a plant on Finney avenue and the Belt Line Railroad for the manufacture of touring cars. There will be provided 25,000 square feet of floor space. As the parts will be made by other plants, the work in the plant will be confined mostly to assembling, so that little machinery will be required, although a few small machine tools may be purchased.

Lord Baltimore's New Building—The Lord Baltimore Truck Co., Baltimore, Md., will move into its new building on July 20. This plant, situated on Bank and Fifth streets, Highlandtown, Baltimore, is 50 by 140 feet, two stories high with a 6-ton elevator. This building will be devoted to the manufacturing of Lord Baltimore internal gear-driven 1 and 2-ton trucks. In the new quarters there will be a paint shop and the cars will be finished complete by the company. The company has just received an order from the War Department for a 1½-ton truck.

Alter Co. in New Plant—The Alter Motor Car Co., formerly at 1146 Grand River avenue, Chicago, has moved into its new plant in Plymouth, Mich., a two-story plant, 50 by 200 feet. The concern, which is a new one, recently shipped its first ten cars and has several hundred cars booked to be delivered within the next few months. "We will be pretty busy from now on," said H. P. Choate, of the company, "catching up with our back orders. We have been delayed, especially because it took much longer to get the plant fixed up than had been anticipated."

Studebaker Acquires New Building—The Studebaker Corp., Detroit, Mich., has recently acquired the building at Hastings street and the Boulevard, Detroit, which will be used as a service department. This gives the Studebaker over 100,000 square feet of additional floor space, and means the employment of about 100 more men. When the 1,200 feet of new loading docks on Clark and Jefferson avenues, Detroit, will have been erected the Studebaker Corp. will have facilities to handle 800 freight cars per day.

Automobile Plant for Calumet—A letter has been received by Secretary George L. Price, of the Commercial Club of Calumet, Mich., from a new motor car manufacturing company, recently organized, but whose name will not be made public at present, and which desires to locate its plant in the Michigan copper district. The automobile company, in its correspondence, stated that it will have a yearly output of 1,500 cars and give employment to a large number of men.

Will Manufacture Garage Tools—The International Electric Tool Co. has been organized in Milwaukee, Wis., by a number of well known men in the electrical and engineering field to engage in the manufacture of a line of electrical tools for garages, machine shops, foundries, etc. The officers are; President, William R. Sorgel; vice-president and secretary, William H. Gaulke; treasurer, E. K. Rundle. Factory space has been leased and equipment is now being installed.

Simmons Co.'s Three New Buildings—The Simmons Mfg. Co., Kenosha, Wis., a large producer of spring sets for motor car cushions and upholstery, and the largest manufacturer of metal beds and parts in the world, has broken ground for three additions to cost $100,000 and be completed by August 15. The buildings will consist of a machine shop, pattern shop and drafting room, 60 by 260 feet; a gray iron, brass and bronze foundry and blacksmith shop, 60 by 200 feet; and a pattern storage house, 40 by 125.

The Automobile Calendar

July 18-19	Seattle, Wash., Track Meet, Meadows Amusement Co.
July 25-26	Belgium Grand Prix Road Races.
July-August	French Army Truck Subsidy Trials.
Aug. 1-3	Galveston, Tex., Beach Races.
Aug. 2-9	Grenoble, Automobile Club of France's 6-Day Motorcycle and Cyclecar Reliability Contest in French Alps.
Aug. 16	Le Mans, France, Automobile Club de la Sarthe's Coupé International Light-Car Race, 1 liter, 400 maximum cylinder area, 350-500 kilos weight.
Aug. 17	Le Mans, France, Auto Club de la Sarthe's Grand Prize de France for 4½ liter cars.
Aug. 21-22	Chicago, Ill., Elgin Road Races, Chicago Automobile Club.
Aug. 23	Auvergne, France, Coupé de l'Auto Race.
Aug. 27	Brooklands Track, England; Annual Automobile Race.
Aug.	Denver, Colo., 650-mile Run, Colorado Springs to Salt Lake City.
Aug.	Russia, Road Race, Coupe de l'Empereur, 2,500 miles.
Sept. 6-7	Brescia, Italy, Auto Club of Italy's 4½-liter Grand Prize.
Sept. 6-7-8	Newark, N. J., Cyclecar Reliability Tour to Atlantic City.
Sept. 7-14	Indianapolis, Ind., Automobile Show, Indianapolis Automobile Trade Assn.
Sept. 9	Corona, Cal., Road Race, Corona Auto Assn.
Sept. 10	Portsmouth, Eng., Autumn Conference, Institute of Metals.
Sept. 10-15	Berlin, Germany, German 4½-liter race.
Sept. 15-Oct. 11	New York City, Commercial Tercentenary Celebration.
Sept. 26	Brooklands Track, England, Annual Automobile Race.
Sept. 26-Oct. 6	Berlin, Germany, Automobile Show.
Oct.	Philadelphia, Pa., E. V. A. A. Annual Convention.
Oct. 7-17	New York City Electric Vehicle Show, Grand Central Palace.
Oct. 9-Nov. 2	S. A. E. European Trip.
Oct. 16-26	Paris, France, Automobile Salon.
Oct. 17-24	Pittsburgh, Pa., Automobile Show, Auto Dealers Assn., Inc.
Oct. 19, 20, 21	Philadelphia, Pa., Elec. Veh. Assn's Convention.
Oct. 19-26	Atlanta, Ga., American Road Congress of the American Highway Assn. and the A. A. A.
Oct. 28-31	Milwaukee, Wis., Convention, Northwestern Road Congress, Auditorium.
November	El Paso, Tex., Phoenix Road Race, El Paso Auto Club.
Nov. 6-14	London, England; Olympia Show.
Nov. 8-9	El Paso to Phoenix, Ariz., Automobile Race.
November 8-11	Shreveport, La., Track Meet, Shreveport Auto Club.
November 15	Paris, France, Kerosene Motor Competition.
Jan. 2-9	New York City, Annual Automobile Show, Grand Central Palace.
Jan. 23-30	Chicago, Ill., Automobile Show, First Regiment Armory.

The Week in the Industry

Motor Men in New Roles

DODGE BROS. Announce District Agents—Dodge Bros., Detroit, have made the following appointments as district representatives: C. W. Matheson, in New York, with jurisdiction over the eastern half of that state, the northern half of New Jersey, the eastern half of Pennsylvania and the state of Connecticut. Mr. Matheson is well known in the trade, having been the organizer and president of the Matheson Motor Car Co., Wilkes-Barre, Pa., and later of the Matheson Automobile Co., New York. More recently he was first, western manager for the Palmer-Singer Co., and then became their general sales and advertising manager. F. L. Jones, formerly with S. F. Bowser & Co., the tank makers, and with Armour & Co., Chicago, will look after the Dodge Bros. interests in Philadelphia. A. C. Templeton, formerly in charge of the Kisselkar Sales Co. for northern Wisconsin and Michigan and at one time Detroit representative for these cars, and later with the Winton Motor Car Co., will have charge of Minneapolis and the surrounding territory. C. H. Hurst, formerly in Canada and more recently in Chicago with the White, will look after the business in Omaha, Neb., and surrounding territory.

Jones Lippard-Stewart Representative—C. R. Jones has been appointed district representative of the Lippard-Stewart Motor Car Co., Buffalo, N. Y., with headquarters in Dallas, Tex.

Smith Chandler Sales Manager—E. V. and Lionel Armstrong have taken charge of the new home of the Chandler Motor Car Co. in Los Angeles. D. P. Smith has been named sales manager.

Evans Goodyear Service Manager.—D. E. Evans, formerly sales manger of the General Motor Truck Co., St. Louis, Mo., is now service manager of the Goodyear Tire & Rubber Co., Detroit.

Hole Manager—The Wilcox Motor Car Co., St. Louis, Mo., has appointed a new manager for the St. Louis branch. He is Frederick E. Hole and succeeds J. P. Gertsen, who resigned because of ill-health.

Horton with Dodge Bros.—E. J. Horton, recently Eastern sales manager of the Empire Automobile Co., Indianapolis, Ind., and who also was with the R-C-H Corp., is now a member of the staff of Dodge Bros., Detroit.

Jacks Retail Sales Manager—O. A. Jacks has been appointed retail sales manager of the La Crosse Auto Co., 921 Hennepin avenue, Minneapolis. Minn. The company handles the Marathon, Imperial and Herreshoff cars.

Greene Succeeds Weldon—F. A. Greene succeeds Frank Weldon as manager of the Cole Motor Co., Des Moines, Ia. Mr. Weldon continues his connection with the company and probably will accept another agency in the state.

O'Brien Goes to Newark—Manager Sills of the Chevrolet Co., of New England, has transferred F. O'Brien, the head salesman at the Boston branch, to Newark, N. J., where he will be manager of the company's branch there.

Lersch Herreshoff Sales Manager—V. D. Lersch, manager for the Goodyear Rubber Tire Co., Albany, has resigned that position to become sales manager for the Herreshoff Motor Sales Co., the general sales agents for the Herreshoff Light Car Co.

Join Locomobile Branch—J. W. Burke, formerly with the sales staff of the New England Fiat branch, and W. S. Porter, of New York, are two recent additions to the sales department of the Boston branch of the Locomobile Co., the latter being sales manager.

Butler Makes Change—A. I. Butler, formerly manager of the Goodyear Tire & Rubber Co., Brooklyn, N. Y., is associated with The Batavia Rubber Co., New York City, in the capacity of special representative. Mr. Butler will look after northern New York territory.

Marcotte in Detroit—Roy E. Marcotte, for the past two years manager of the advertising department of the Canadian branch of the Studebaker Corp., Detroit, Mich., is now with the Detroit Studebaker and will continue taking care of the Canadian publicity from there.

McKenny Makes Change—N. E. McKenny, formerly with the American Steel & Wire Co., the American Plow Co., Madison, Wis., and the Zender, Paeschke Frey Co., Milwaukee, Wis., is now with the Federal Motor Truck Co., Detroit, being in charge of the promotion department.

Mooney Hupp Sales Manager—F. J. Mooney, advertising expert of the Hupp Motor Car Co., Detroit, Mich., who had temporary charge of the spring selling campaign, has been appointed sales manager of that company, in addition to being in charge of the advertising department.

Voorheis Oakland Sales Manager—C. B. Voorheis, until recently sales manager of the King Plow Company, Peoria, Ill., has been appointed sales manager of the Oakland Motor Car Co., Pontiac, Mich. He will be closely associated with Vice-President and General Sales Manager F. W. Warner.

Williams Heads Haynes Agency—The Haynes Auto Co., Kokomo, Ind., has established an office in this city at Fourth avenue and York street. Dave Williams, formerly connected with the advertising department of the American concern at Indianapolis, is the representative of the factory in charge here.

Joe Dawson Improving—Joe Dawson, who was injured in the 500-mile race at Indianapolis, Ind., May 30, while driving a Marmon car, is much improved. He is still in the hospital and it may be several weeks before he is able to be out. It is announced at the hospital, however, that his complete recovery is assured.

Macey Resigns—R. Ward Macey, Jr., recently severed his connection with the Premier Motor Mfg. Co., Indianapolis, Ind., but retains his interest in the company as a stockholder. Before becoming sales manager of Premier, Mr. Macey was in the sales department of Franklin, and before with Henry Ford.

Spear with Scripps-Booth—R. H. Spear, formerly a specialist in factory organization, management and executive administration and editor of the "Commercial World Encyclopedia of Accounting," has been appointed general manager of the Scripps-Booth Co., Detroit, makers of the Scripps-Booth cyclecars.

Campbell's New Job—C. I. Campbell, secretary of the Boston Automobile Dealers Assn., has been made manager of the Rockingham Fair, which will take place at Salem, N. H., during the first week of September on the big grounds formerly devoted to horse racing, and later where automobile contests were held.

New Resigns—Dr. Norman R. New, sales manager of the Milwaukee branch of the Mitchell Automobile Co., Chicago, resigned July 1 to resume his association with the home office and headquarters in Chicago after a 2-year stay in Milwaukee. H. W. Bonnell, local manager, assumes the position of sales manager in addition to his other duties.

Brandt Joins Hudson Forces—E. H. Brandt has resigned from the Detroit-Cadillac Co., New York City, to become the general eastern representative of the Hudson Motor Car Co., Detroit. He will make his headquarters in New York City and will have charge of the Hudson company's eastern business in the territory including the Eastern States and eastern Canada.

French National Advertising Manager—L. S. French has become advertising manager of the National Motor Vehicle Co., Indianapolis, succeeding P. P. Willis, who resigned to accept a position with the advertising agency of Thomas Carroll Tripp, Cleveland, O. Mr. French until recently was with the Henderson Motor Car Co., and prior to that was with the Cole Motor Car Co.

Sudrow King Sales Manager—F. G. W. Sudrow has been appointed by the King Motor Car Co., Detroit, Mich., as southern district sales manager. Mr. Sudrow was for 8 years secretary and treasurer of the National Battery Co., of Buffalo; for 2 years was connected with the Stoddard-Dayton Motor Car Co., of Dayton, O., and has also been sales manager of the Apple Electric Co. and the Marion Motor Car Co. He has a wide acquaintance of friends throughout the southern section, and will assume his duties July 1.

Smith Heads Regal Agency—R. C. Smith, formerly with the Minnesota Motor Sales Co., and A. P. Heaney, lately with the La Crosse Auto Co., both of Minneapolis, Minn., are now respectively president and general sales manager of the Regal Motor Car Company, of Minneapolis, which has been incorporated with a capital stock of $25,000, and will act as distributors for the Regal cars in Minnesota, North Dakota, the Northern half of South Dakota and Western Wisconsin. The company is located at 1400 Hennepin avenue.

Recent Incorporations in the Automobile Field

AUTOMOBILES AND PARTS

BUFFALO, N. Y.—Hudson-Oliver Motor Co.; capital, $15,000; automobiles. Incorporators: E. G. Oliver, George B. Wesley, Charles W. Pooley.

CHICAGO, ILL.—Halleman Motor Livery Co.; capital, $1,000; construct, maintain, operate and deal in automobiles. Incorporators: G. W. Halleman, F. H. Janowisk, Harry De Coudres, J. Dulsen.

CLEVELAND, O.—Atlas Tire and Rubber Co.; capital, $5,000; to deal in automobiles, tires, etc. Incorporators: J. M. Bernstein, E. E. Gross, N. J. Baker, F. Allen, J. M. Ulmer.

CLEVELAND, O.—Trenton Motor Sales Co.; capital, $5,000; to deal in automobiles. Incorporators: W. K. Stanley, J. R. Jewitt, P. C. Steller, S. Horwitz, I. A. Skinner.

COLUMBUS, O.—Justus & Parker Co.; capital, $15,000; to deal in automobile supplies and accessories. Incorporators: E. E. Parker, C. E. Justus, H. M. Parker, Bernard Smith, J. A. Justus.

COLUMBUS, O.—Tesseyman Auto Co.; capital, $20,000; to deal in automobiles. Incorporators: J. E. Tesseyman, I. A. Tesseyman, F. N. Boyd, J. F. Galloway, M. Heinrich.

DETROIT, MICH.—Steere Engineering Co.; capital, $50,000; to manufacture engines, etc. Incorporators: W. S. Blauvelt, Currier Lang, A. H. Green, F. W. Steere.

DETROIT, MICH.—Simplex Engine Co.; capital, $40,000; to manufacture engines. Incorporators: H. Fraser, W. G. Taylor, F. Smallridge.

DETROIT, MICH.—Princess M. C. Co.; capital, $100,000; automobiles. Incorporators: Ola C., I. N. White, K. F. Klein.

HAMILTON, O.—Miami M. C. Co.; capital, $10,000; to deal in automobiles and supplies.

MINNEAPOLIS, MINN.—Regal Motor Co.; capital, $25,000; to deal in automobiles. Incorporators: R. C. and I. E. Smith, J. Costella.

MOLINE, ILL.—Kellogg Turbine Muffler Co.; capital, $15,000; general manufacturing, including automobile parts and accessories. Incorporators: E. M. Kellogg, E. M. Kellogg, Jr., E. C. Brain.

MONTREAL, CAN.—Stockwell Motors, Ltd.; capital, $100,000; to manufacture automobile trucks. Incorporators: F. B. Stockwell, E. E. Leger, H. E. Walker.

NEW YORK CITY—James C. Stopps; capital, $15,000; automobiles. Incorporators: James C. Stopps, Jos. M. Palmer, Louis C. Goetting.

NEW YORK CITY—Motor Credit Co.; capital, $1,000; to deal in automobiles. Incorporators: Arthur Enock, Adolph Morris, David Grinberg.

OSWEGO, N. Y.—Ontario Motor Car Co.; capital, $5,000; automobiles. Incorporators: Arthur P. Wolever, Frank C. Wolever, Chas. A. Peterson.

OWEGO, N. Y.—B. Z. T. Car Co.; capital, $25,000; to deal in automobiles. Incorporators: F. M. Baker, F. D. Baker, C. K. Bell, all of Owego.

PHILADELPHIA, PA.—Crown Tire & Supply Co.; capital, $100,000; to manufacture, sell and deal in automobiles and accessories. Incorporators: F. W. Thompson, B. S. Edwards, J. M. Frere.

PHILMONT, N. Y.—High Rock Motor Co.; capital, $5,000; to manufacture motors. Incorporators: F. B. Harder, P. M. Harder, L. F. Harder, all of Philmont, N. Y.

PUNXSUTAWNEY, PA.—International Motor Co.; capital, $15,000; to manufacture rotary motors. Incorporators: C. M. Long, Jacob E. Wolf, William Burley, J. P. North, A. B. North, Odessa Whiting, F. J. Smith, I. N. Graffius.

ROCHESTER, N. Y.—Pritchard-Lyon Motors Corp.; capital, $25,000; to manufacture motors. Incorporators: P. H. Pritchard, Aust avenue, Brighton, N. Y.; A. R. Pritchard, C. B. Lyon.

ST. LOUIS, MO.—Champion M. C. Co. of Missouri; capital, $50,000; to deal in automobiles. Incorporators: A. R. Walton, O. A. Peters, E. D. McMahon.

TORONTO, ONT.—Dominion Motor Car Co.; capital, $40,000; automobiles.

WATERLOO, IA.—Waterloo Overland Co.; capital, $10,000; automobiles and accessories. Incorporators: John Hanson, J. H. Hadley.

WATERVILLE, N. Y.—Hale Auto Corporation; capital, $500; automobiles. Incorporators: J. Chas. Hale, Augusta M. Hale, Chas. R. Hale.

GARAGES AND ACCESSORIES

BROOKLYN, N. Y.—Bedford Taxi Cab Co.; capital, $5,000; general taxicab business. Incorporators: Isaac Cohen, 128 Hamboldt street, Brooklyn; Abr. Gurewitz, B. H. Fraum.

BRONX, NEW YORK CITY—Grand Concourse Garage Co.; capital, $5,000. Incorporators: John M. Ireland, Mary A. Ireland, Caroline Haffen.

BRONX, NEW YORK CITY—Puncture Seal Co.; capital, $5,000; to manufacture compounds for mending inner tubes, tire accessories, etc. Incorporators: Henry D. Bahn, Frank S. Murray, Frank Eber.

CHICAGO, ILL.—Davis Automobile Accessories Co.; capital, $25,000; manufacturing automobile accessories. Incorporators: E. M. Oehlert, A. S. Kedzie, Harry Garrett.

CLEVELAND, O.—Atlas Tire and Rubber Co.; capital, $5,000; to deal in automobile tires. Incorporators: J. M. Bernstein and others.

CLEVELAND, O.—Harris-Henderson Tire Co.; capital, $5,000; to deal in tires and accessories. Incorporators: J. A. Harris, F. A. Henderson, J. C. Barkley, R. L. McVean, J. P. Dempsey.

GALION, O.—Galion, Mt. Gilead and Cardington Motor Transit Co.; capital, $20,000; to operate a motor bus line. Incorporators: G. C. Hornatin, F. B. McMillin, C. B. Marsh, D. J. Donavin, C. J. Cugler, E. H. Conaway, M. L. Phillips.

HAMILTON, ONT.—National Rubber Co., Ltd.; to manufacture automobile tires. Incorporators: Geo. Wenig, D. B. Wood, R. W. Long, Chas. L. Boyd, F. E. Walker.

HEMPSTEAD, N. Y.—Comfort Shock Absorber Co.; capital, $500; to manufacture shock absorbers for automobiles. Incorporators: Geo. G. Bouthinon, Ida Bowdren, Geo. P. Bowdren.

INDIANAPOLIS, IND.—Gates Mfg. Co.; capital, $20,000; to manufacture motor car tops and seat covers. Incorporators: F. E. Gates, R. A. Gates, F. O. Lane.

MINNEAPOLIS, MINN.—Lyndals Garage Co.; capital, $25,000; to deal in automobiles. Incorporators: C. E. Bullock, H. M. Lewis, E. O. Miller.

MT. GILEAD, O.—Galion, St. Gilead and Cardington Motor Transit Co.; capital, $20,000; general bus line.

NEW YORK CITY—Hollywood Garage Corporation; capital, $20,000. Incorporators: John J. Phealan, Gerald A. Grant, Max Frieder.

NEW YORK CITY—Independent Auto Renting & Garage Co.; capital $500. Incorporators: Thos. Callahan, Chas. M. Siegel, Chas. Peebner.

NEW YORK CITY—New York Steam Auto Tire Works; capital, $10,000. Incorporators: John J. Foley, Minnie Beck, J. A. Callanan.

NEW YORK CITY—Public Service Auto Co.; capital, $1,000. Incorporators: Frank J. Bryant, Henry Wilber, Henry F. Carden.

NEW YORK CITY—Wall Street Taxi Cab Co.; capital, $1,000. Incorporators: Bessie O'Hare, John J. O'Hare, Danl. O'Donnell.

NEW YORK CITY—Western Tire Co. of America; capital, $5,000; general tire business. Incorporators: L. Walter Lisberger, Joel Jacobs, Frank H. Cross.

NEW YORK CITY—Seventh Street Garage; capital, $10,000; garage business. Incorporators: S. Frankfater, J. Klinger.

NEW YORK CITY—Imperial Auto Touring and Taxicab Co.; capital, $1,000; general taxicab business. Incorporators: A. S. Gussow, 621 East 3d street, New York City; A Miller.

NEW YORK CITY—Progress Auto Renting Co.; capital, $1,000; to rent automobiles. Incorporators: Morris Klein, 101 W. 114th street, N. Y. City; Samuel Klein, A. P. Blum.

PITTSBURGH, PA.—Auto Sprinkler Equipment Co.; capital, $25,000; to manufacture automobile sprinklers. Incorporators: H. A. Logue, H. C. Fry, Jr., J. E. Stone.

QUEENS, N. Y.—Astoria Taxicab Corp.; capital, $3,000; taxicab business. Incorporators: G. L. Doyle, W. F. Wund, A. V. Kenealy.

ROCK ISLAND, ILL.—Sandbo Starter Co.; capital, $10,000; to manufacture and deal in engine starters. Incorporators: H. W. Danimann, A. G. Arp, A. L. Sandbo.

SAN FRANCISCO, CAL.—Swan Carburetor Co.; capital, $200,000; to manufacture carburetors. Incorporators: H. S. Hutchings, E. M. Boynton, B. W. Boynton.

SAVANNAH, GA.—Harris Tire Co.; capital, $40,000; to manufacture automobile tires. Incorporators: S. N. Harris, H. M. Garmany, C. S. Richardson, L. B. Rith, M. B. Brabham, J. E. Mosher, E. De Loach, J. L. Sellers.

TOLEDO, O.—Rupp-Skeldon Motor Co.; capital, $50,000; to manufacture and deal in all kinds of motors. Incorporators: Robert G. Young, James Nye, James Greenwald, Bess Young and B. W. Johnson.

TULSA, OKLA.—Hi-Grade Gasoline Co.; capital, $1,000; to deal in gasoline. Incorporators: B. Revel, D. C. Rose, R. S. Fellows.

WARREN, O.—Auto Test Co.; capital, $20,000; to deal in automobile supplies. Incorporators: F. L. Spellman, H. E. Vaughan, H. G. Paden, F. W. Andrews and C. S. Vaughan.

WHITE PLAINS, N. Y.—Ashley Wire Wheel & Rim Co.; capital, $50,000; manufacture wire wheels and rims for autos. Incorporators: R. W. Ashley, F. W. Kolb and Henry L. Stuart.

WILMINGTON, DEL.—International Motor Wheel Co.; capital, $1,000,000; to manufacture automobile wheels. Incorporators: H. E. Tatter, W. J. Maloney, O. J. Reichard.

CHANGES OF NAME AND CAPITAL

CLEVELAND, O.—Alco Motor Co.; name changed to Main Motor Co.

DETROIT, MICH.—Canfield Garage Co.; capital increased from $7,000 to $12,000.

DETROIT, MICH.—Fischer Closed Body Co.; capital increased from $125,000 to $500,000.

INDIANAPOLIS, IND.—Service Motor Car Co.; change of name to Service Motor Truck Co.

OKLAHOMA CITY, OKLA.—Globe Petroleum Co.; capital increased from $8,000 to $24,000.

PORT WASHINGTON, WIS.—Turner Mfg. Co.; capital increased from $100,000 to $150,000.

Automobile Agencies Recently Established

PASSENGER CARS

Place	Car	Agent
Alva	Okla	Doty & Adams
Ashland, Ky	Detroiter	Wellman M. C. Co.
Ashland, Ky	Ford	Marting's Gar.
Ashland, Ky	Overland	Wellman M. C. Co.
Attica, O	Detroiter	H. Fike
Booher, W. Va	Detroiter	C. B. Booher
Bowling Green, Ky	Hupmobile	ImperialAuto Co.
Bowling Green, Ky	Studebaker	ImperialAuto Co.
Braddyville, Ia	Maxwell	Wort, Friend & Andrews
Brookfield, Mo	Moon	Barbee Gar.
Bryan, O	Detroiter	C. F. Yunck
Cambridge, O	Detroiter	E. B. Shipley
Campbellsville, Ky	Ford	Buchanan-Lyon Co.
Carrollton, O	Saxon	C. A. Hess
Cavett, O	Detroiter	I. N. Borden
Cedar Rapids, Ia	Moon	Moon Auto Sales Co.
Celina, O	Detroiter	Wagner Motor Sales Co.
Chattanooga, Tenn	Buick	Chattanooga Buick Co.
Chattanooga, Tenn	Chalmers	Chattanooga Motor Car Co.
Chattanooga, Tenn	Hudson	Bill Jones Auto Co.
Chattanooga, Tenn	Overland	Wallace Buggy Co.
Chico, Cal	Maxwell	J. I. Lewis
Cleveland, O	Grant	Crotty Co..
Cleveland, O	Jeffery	J. H. Greenwald
Cleveland, O	Mercer	G. L. Sitgreaves
Colby, Kan	Maxwell	J. T. Fitzgerald
Dana, Ind	Maxwell	Scott & Stanfield
Elkhorn, Neb	Maxwell	H. J. Schneider
Evansville, Ind	Allen	E. H. Rasch & Co.
Fayetteville, O	Detroiter	C. McGuillan
Fredricktown, O	Detroiter	Leedy Farm Suppply Co
Glenmont, O	Detroiter	G. L. Robinson
Goodland, Kan	Maxwell	R. A. Kent
Great Bend, Kan	Maxwell	J. A. Pritchard
Halstead, Kan	Maxwell	R. E. Jones
Hawesville, Ky	Ford	T. D. Hale
Hot Springs, S. D	Maxwell	W. A. Stanley
Hoxie, Kan	Maxwell	F. A. McIvor
Jamestown, O	Detroiter	W. F. Harper
Knoxville, Tenn	Cadillac	Cadillac Sales Co.
Knoxville, Tenn	Hudson	Rodgers & Co.
Knoxville, Tenn	Hupmobile	Rodgers & Co.
Lancaster, O	Detroiter	C. E. Cline
Lexington, Ky	Briscoe	A. W. T. Davis
Lexington, Ky	Howard	Phoenix M. C. Co.
Lexington, Ky	Reo	Phoenix M. C. Co.
Logan, O	Detroiter	Hocking Valley Auto Co.
Ludington, Mich	Ford	Cartier Auto & Gar. Co.
Ludington, Mich	Hupmobile	Cartier Auto & Gar. Co.
Ludington, Mich	Jackson	Cartier Auto & Gar. Co.
Ludington, Mich	Pullman	Cartier Auto & Gar. Co.
Ludington, Mich	Oldsmobile	D. MacVichie
Lyons, Kan	Maxwell	Lyons Auto Co.
Marietta, O	Detroiter	F. G. Henry
Marietta, O	Chandler	Jacob Spindler
Marion, O	Detroiter	A. D. Hill
Maysville, Ky	Ford	Central Garage Co.
Maysville, Ky	Hupmobile	Kirk Bros.
McCracken, Kan	Maxwell	Hollis Motor Co.
Menominee, Mich	Hudson	Auto Service Co.
Minister, O	Detroiter	J. B. Piening & Son
Minneapolis, Minn	Regal	Regal M. C. Co.
Monessan, Pa	Moon	Monessan Plumbing Co.
Montreal, Que	Moon	Sevigny & Lalonde
Newark, O	Detroiter	J. E. Sigler & C. Norris
Newport, R. I	Ford	D. W. Flint
New Straitsville, O	Detroiter	D. Watkins
Norton, Kan	Maxwell	Garrity & Mansfield
Norwalk, O	Chevrolet	Big Gar.
Omaha, Neb	Overland	J. R. Jamison
Otway, O	Detroiter	J. R. Walsh
Piqua, O	Detroiter	C. R. Alexander
Pomona, Cal	Maxwell	F. A. Moore
Poole, Ky	Maxwell	Poole Motor Sales Co.
Prospect, Ky	Maxwell	G. S. Dick
Providence, R. I	Hudson	R. W. Powers
Redlands, Cal	Maxwell	R. M. Morrow
Redondo Beach, Cal	Maxwell	B. E. Savage
Saginaw, Mich	Overland	Simons Sales Co.
Sentinel Butte, N. D	Maxwell	C. J. Englund
Sherwood, O	Detroiter	Sherwood Gar.
Simpsonville, Ky	Maxwell	L. G. Baskett
Springfield, O	Detroiter	W. E. Neer
Sunbury, O	Detroiter	G. E. Murphy
Tippettville, Ga	Maxwell	A. B. Tippitt Sons Co
Valley City, N. D	Maxwell	F. Flora
Washington, C. H., O	Detroiter	Economy Sales Co.
West Manchester, O	Detroiter	H. A. Gaeting
Wheeling, W. Va	Detroiter	Union Auto Co.
Wilmington, O	Detroiter	E. T. McPherson
Wooster, O	Detroiter	Wooster Gar.
Youngstown, O	Herff-Brooks	Cartercar Sales Co.

COMMERCIAL VEHICLES

Place	Car	Agent
Bowling Green, Ky	Koehler	Imperial Auto Co.
Clinton, N. I	Koehler	Frederick Neuhäus
Galveston, Tex	Koehler	Jno. Christensen & Co.
Meridian, Miss	Koehler	E. S. Curtice
St. Louis, Mo	Commerce	Federal Truck Co.
Sterling, Col	Hercules	Sterling Hdw. & Implement Co.
Summit, N. J	Koehler	E. F. Anderson
Twin Falls, Idaho	Hercules	Diamond Hdw. Co.
Wagner, S. D	Hercules	F. S. Strohbehn
Washington, Pa	Koehler	Standard Auto Co.
Wheeling, W. Va	Hercules	Century Motor Car Co
Wiley, Col	Hercules	J. B. Duffield
Worcester, Mass	Koehler	Whalen Bros.
Youngstown, O	Koehler	Regal Sales Co.

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Even if the price *was* slightly higher than the *imitation.*

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Service Stations in All Principal Cities in the United States, Canada and Mexico

(107)

DINSHAH Motor Tester—An electrical device showing where the motor is at fault, whether this trouble is electrical or mechanical, has been brought out by the Dinshah Sales Corp., 735 Seventh avenue, New York City. While it is attached to the high-tension circuit it is so delicately attuned that it will show all the ordinary mechanical troubles, such as lack of compression, faulty armature bearings, etc.

The tester, Fig. 1, consists of a set of spark gaps, one for each cylinder, and a set of vacuum tubes that give varying colors, depending on the condition of the electrical circuit and the motor. This outfit is housed in a box provided with a convenient visor that keeps out the light and aids in watching the operation of the instrument.

In a four-cylinder motor, for example, there are heavily insulated wires provided with clip terminals so that they may be quickly attached to the spark plugs or magneto terminals. These wires run to individual terminals in the bottom of the tester box. On one side of these terminals are the spark gaps and on the other side are the vacuum tubes. The return connections are grounded through a single wire that is also provided with a clip terminal so that it can be attached to any convenient metal part.

Note the Sparks

In testing a motor the first thing to do is to determine whether all cylinders are receiving sparks that are both hot and properly timed. This is accomplished by disconnecting the spark plug terminals and attaching the four leads of the motor tester to the magneto terminals. Then the motor is cranked over by hand, and if the sparks occur in the regular order and if the tubes show flames of a uniform color, then the ignition and timing is all right. It must not be overlooked to connect the leads from the tester according to the firing order of the motor. If this is done the sparks will occur in 1-2-3-4 order in the instrument. The spark gaps are set at such a distance that it takes the same voltage for the current to jump the gap as is required when the spark crosses the plug gap under compression. In other words, the resistance offered by the atmospheric air gap is equal to the resistance offered by the smaller gap under full compression pressure.

Where it is inconvenient to crank the motor by hand or by a starter, it may be run on two cylinders while the other two are being tested.

Having determined that the sparks are of good quality and that the firing order is correct, all the high-tension wires are connected up again and the four-tester leads are fastened to the spark plug terminals.

It will be noted that on the inside of the tester cover there is a full set of instructions so that anyone can determine, in an instant, just where the trouble is. These directions are divided into two parts, one set referring to the testing of the electrical generating system, as it is called, and the other to the spark plugs, carbureting system and compression.

Testing Directions

For testing the electrical generating system, disconnect the spark plug wires and connect them to the four leads running from the tester, and ground the fifth. Turn the crank, or operate the self-starter and look into the instrument.

1—A regular succession of white sparks at the gaps, accompanied by colored flashes in the four tubes, indicate a perfect electrical generating system.

2—If the sparks miss irregularly the trouble is due to a faulty distributor.

3—If the sparks skip back and forth regularly in two tubes, a loose armature bearing is indicated.

4—Sparks missing in two tubes show that the contact breaker is faulty.

5—All tubes flashing without sparks or with irregular sparks means weak batteries, magnets or loose connections.

6—Darkness in one tube—no electricity in that cable.

7—Darkness in all tubes—dead electrical generating system.

8—Sparks in any tube without a flash show that the engine tester is out of order and should be returned to the makers.

Having put the electrical generating system in perfect order connect the high-tension wires to the spark plugs and hook on the four clips. Then run the motor. Under these conditions no sparks will be seen, the condition of the motor being indicated solely by the colors in the tubes.

9—If all the tubes are flashing the same color the spark plugs are in perfect condition.

10—If the motor continues to operate badly the trouble is due to carburetion.

11—If a tube flashes and darkens irregularly there is a leakage of electricity or the plug point is dirty or too close.

12—A dark tube indicates that that plug is short-circuited.

13—A blinking tube shows that there is a loose connection.

14—A tube flashing very dull in comparison with the others indicates that there is a loss of compression.

15—If a tube sparks when the motor turns slowly it shows that the plug points are too far apart.

The motor tester is made with four, six and eight leads for motors of corresponding numbers of cylinders and it is planned to manufacture one with two leads for the cyclecar and motorcycle trade.

Gahm Auto Starter—A simple starter which is operated by a lever on the dash is manufactured by the Gahm Mfg. Co., Streator, Ill.

It consists merely of a crank that is attached to a cable running over a pulley to the dash. When the handle on the dash is pulled the motor is cranked.

To facilitate starting a primer that holds more than a quart of gasoline and connects direct with the intake manifold by a small pipe is used. Flow of gasoline to the manifold is controlled from the dash.

O-Lax Carbon Remover—A liquid oxygen carbon remover called O-Lax is being marketed by the Wilkes & Grant Co. of Louisville.

To remove the carbon the motor is run until hot, then take out the spark plugs of two cylinders, turn engine over until the valves are closed and see that the valves are seated. Put in from 2 to 3 ounces of the liquid in the cylinders, replacing the spark plugs immediately after, as the liquid changes into an oxygen gas when it touches the hot cylinders. After fixing the two closed cylinders and replacing the spark plugs, let same stand from 10 to 15 minutes, then the motor is started and the carbon blown out through exhaust by speeding up the motor. Then treat the remaining cylinders same as above until car is cleaned.

O-Lax is put up in quart sizes selling at $2.50, 5 gallon selling at $4.50 and 1 gallon selling at $8. A guarantee to refund money if O-Lax does not remove the carbon from the engine is given each purchaser.

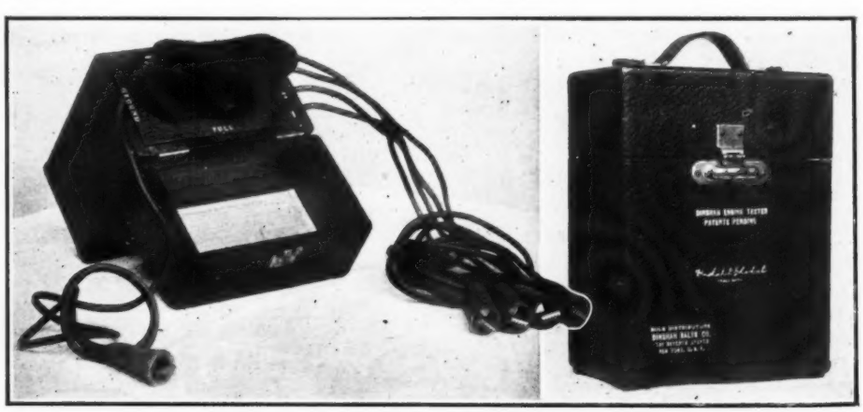

Fig. 1—Motor testing device brought out by the Dinshah company with which the cylinder conditions can be learned